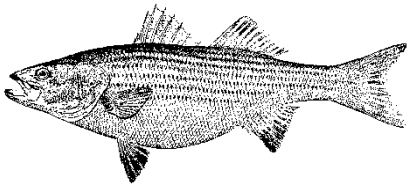

Review of North Carolina's Striped Bass Fisheries and Monitoring Programs in 2009

Report to the
Atlantic States Marine Fisheries Commission
Striped Bass Technical Committee

North Carolina Department of Environment and Natural Resources

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1. Atlantic Ocean Fisheries

1.1 Atlantic Ocean Commercial Fishery

Atlantic Ocean migratory striped bass, *Morone saxatilis* are often present within the state waters of North Carolina's (NC) coast from mid-November through late March, at which time North Carolina utilizes its annual Atlantic Ocean striped bass commercial harvest allocation. The following section includes information regarding Atlantic Ocean commercial and recreational harvest and discards during the 2008/2009 quota year (1 December 2008 – 30 November 2009) and the 2009 calendar year, as well as harvest regulations and dealer permits.

Atlantic Ocean Commercial Harvest Regulations

North Carolina maintained a 28 inch (in) total length (TL) minimum size limit for Atlantic Ocean commercial striped bass fisheries. An increase in the total allowable catch (TAC) in January 2003 resulted in a harvest quota of 480,480 pounds (lbs). North Carolina utilizes this quota in a harvest season that overlaps calendar years, from 1 December through 30 November, henceforth referred to as the quota year. The North Carolina Division of Marine Fisheries (NCDMF) allocates the quota equally between the three principle harvest gears (beach seine, gill net, and trawl) resulting in a base allocation to each fishery of 160,160 lbs. The beach seine fishery is normally prosecuted in December, the gill net fishery in January, and the trawl fishery in February. The Atlantic States Marine Fisheries Commission (ASMFC) Atlantic Interstate Striped Bass Fisheries Management Plan (FMP) requires the annual TAC to be adjusted to account for overages from the previous harvest season (ASMFC 1995, 2003), so overages that occurred by a particular gear were subtracted from subsequent allocations to that gear for the following season. Each fishery was restricted by a trip limit per fishing operation, intended to prevent the fisheries from going over their quota, extend the season, and improve monitoring.

One major change occurred in the gear requirements for the beach seine fishery during the 2008/2009 season. Beach seines were required to be constructed of twine size no smaller than #9 (0.042 inches or 1.07 mm) in the wings and no smaller than # 12 (0.046 inches or 1.17 mm) in the bunt. Seines were to be constructed of stretched mesh size of 7 to 10 inches (inclusive) and shall be no more than 30 meshes deep. The gear changes were intended to reduce interactions with marine mammals in the beach seine fishery.

During the 2008/2009 season, the ocean beach seine season was open for 3 days with a 250 fish per operation daily trip limit and 83 days with 150 fish per operation daily trip limit. The ocean gill net season was open for 25 days with a daily trip limit of 10 fish per commercial license holder. The ocean trawl season was open for 58 days with a trip limit of 100 fish per trip or harvest period and for 15 days with a 50 fish limit per trip or harvest period. Landings by each gear type were monitored daily through required quota monitoring reports and monthly through the DMF Trip Ticket Program. The fisheries were closed through proclamation as the TAC was approached or reached.

Atlantic Ocean Dealer Permits

No dealer could possess, buy, sell, or offer for sale, striped bass taken from the Atlantic Ocean without first obtaining a current Atlantic Ocean Commercial Dealer Striped Bass Permit from the DMF. Permits were issued only to individuals holding a valid North Carolina finfish dealer's license.

Dealers were required to affix either a DMF issued striped bass tag or similar tag issued by the state of origin for imported striped bass, through the mouth and gill cover. Landings were reported daily to DMF.

Atlantic Ocean Directed Commercial Harvest

Methods

DMF personnel sampled fish from each fishery, either at the fish house as the catch was unloaded, or in situ during the beach seine fishery. Fish were measured to the nearest mm for fork length (FL) and TL and weighed to the nearest 0.01 kg. Sex was determined using the Sykes (1957) method and scales were removed from the left side of the fish, above the lateral line and between the posterior of the first dorsal fin and the insertion of the second dorsal fin. Scales were cleaned and pressed on acetate sheets using a Carver heated hydraulic press. DMF employees read scales using a microfiche reader set on 24x or 33x magnification. For each sex, a minimum of 15 scales per 25 mm size class was read and subsequently used to assign ages to the remainder of the sample. Age and year class were assigned according to conventions developed by the ASMFC Striped Bass Scientific and Statistical Committee. All data were coded on standardized DMF coding sheets and entered into the DMF biological database.

Numbers of fish per year class were assigned using the following formula:

$$YC_N = L_T \times WTSYC_{S\%} / WTSYC_{SAVG}$$

Where YC_N is the number of individuals per year class, L_T is total landings, $WTSYC_{S\%}$ is the sample percent weight per sex, per year class, and $WTSYC_{SAVG}$ is the sample average weight per individual, per sex, per year class.

Results

The 2008/2009 Atlantic Ocean commercial striped bass fisheries harvested an estimated 9,032 fish weighing 189,995 lbs (Table 1). Length and weight data are presented in Table 2. Sex, FL and TL (mm), weight (kg) and age structures were obtained for 179 fish. The length frequencies peaked at the 925 mm TL bin (Figure 1). The 1992 – 2002 year classes were represented in the sample. The 1997 – 2001 year classes comprised 85% of the harvest by number (Table 1). During the 2008/2009 quota year, the beach haul seine fishery harvested 4,888 lbs, the ocean gill net fishery harvested 51,677 lbs, and the ocean trawl fishery harvested 133,430 lbs.

During the 2008/2009 quota year, all striped bass harvest occurred between 1 January and 30 November 2009. The beach seine fishery opened in December of 2008 but there was no harvest.

Total striped bass losses in the Atlantic Ocean commercial fisheries for the 2009 calendar year are presented in Appendix A.

Atlantic Ocean Bycatch Losses

No at-sea observer coverage was obtained during the 2008/2009 quota year, resulting in no new information on discards.

1.2 Atlantic Ocean Recreational Fishery

Atlantic Ocean Recreational Fishery Monitoring

Methods

The Marine Recreational Fishery Statistics Survey (MRFSS) has been conducted annually by the National Marine Fisheries Service (NMFS) in North Carolina since 1979. The survey consisted of telephone and on-site angler interviews. The telephone interviews were used to collect data on number of trips, fishing locations, and when the trips were made. Information on actual catch (species, number, weight (0.01 kg), FL, and TL) was collected through on-site angler interviews. The data from both types of interviews were combined to produce estimates of total numbers and pounds of striped bass harvested, and total numbers of striped bass released from North Carolina.

Atlantic Ocean Recreational Fishery Regulations

North Carolina maintained a 28 in (711 mm) TL minimum size limit with a two fish per person per day creel limit for 2009. The season remained open throughout 2009. All harvest, release, and length frequency data is obtained from MRFSS. Harvest data (Type A + B1) and released alive data (Type B2) were queried By Wave, All Modes, All Ocean. Only information from Waves 1, 2, and 6 were used due to the high PSE associated with Waves 3, 4, and 5.

Starting in 2005 and continued annually since, a program was initiated in NC in which anglers were required to report all Atlantic Ocean harvested striped bass from the NC/VA line, south to Ocracoke Inlet, for the months of May through October (Waves 3 – 5). Termed the “catch card survey” the reporting procedure required that any striped bass harvested recreationally in the designated area must have a landing tag affixed to the fish before it was removed from the vessel. Anglers that harvested striped bass from fishing piers reported their catch at the pier house before leaving the pier. Surf fishermen reported their catch to the nearest reporting station. Reporting stations were established throughout Dare, Currituck, and Hyde counties. Atlantic Ocean striped bass released alive were not required to be reported. The purpose of the program was to obtain more accurate data on striped bass harvested from the Atlantic Ocean during waves 3 – 5.

Atlantic Ocean Recreational Fishery Harvest

Results

The recreational fishery harvested an estimated 8,097 fish weighing 211,726 lbs in 2009 from the Atlantic Ocean during waves 1, 2, and 6. An estimated 75,273 fish were released alive during this same time. Applying an 8% mortality rate to fish released alive results in an additional 6,022 fish that may have died. MRFSS did not make weight estimates on fish released alive due to unavailability of at-sea observer coverage. Some of the fish released alive may have been undersized; applying the average weight per fish of the harvested fish to the released fish will likely produce an over estimate of the pounds lost due to release mortality. However, if the average weight per fish of the harvested fish (26.15 lbs) is applied to the estimated mortalities of released fish, an additional 157,475 lbs may have been lost.

The length frequency ranged from the 775 mm TL bin to the 1,300 mm TL bin, with the majority of the fish sampled ranging in the 950—1,075 mm TL bins (Figure 2).

The catch card survey was initiated in July of 2005 and has continued annually since. However, there are still concerns of imprecise estimates of striped bass harvest during waves 3-5 in NC. The recreational charter boat sector in particular is reluctant to participate in the survey. During 2009 there were 28 reported striped bass landed during waves 3-5 for a total weight of 353 lbs. MRFSS reported 3,299 (PSE 50.5) striped bass harvested totaling 10,110 lbs (PSE 50.7) for waves 3-5. The DMF is continuing to educate anglers in the various sectors about the benefits of accurate harvest estimates as well as trying to increase enforcement of the program.

Total striped bass losses in the Atlantic Ocean recreational fisheries for the 2009 calendar year are presented in Appendix A.

2. Albemarle Sound Management Area Fisheries

The Albemarle Sound-Roanoke River (A/R) system is one of four designated striped bass producer areas managed under guidelines established by the ASMFC Interstate Striped Bass FMP (1995, 2003). The A/R system is managed for striped bass jointly between the DMF, which manages the Albemarle Sound Management Area (ASMA), and the NC Wildlife Resources Commission (WRC), which manages the Roanoke River Management Area (RRMA). Striped bass management and monitoring requirements imposed on producer areas differ from those required for the Atlantic Coastal stock. North Carolina is required to monitor the A/R striped bass spawning stock abundance and juvenile abundance, accomplished through the WRC spawning grounds electrofishing survey, and the DMF juvenile abundance surveys. In addition, the DMF conducts a fishery independent gill net survey (IGNS) in the spring (March – May) and the fall/winter (November – February) to monitor population abundance and composition of the stock. North Carolina is also required to estimate the age composition and total catch of the various ASMA/RRMA fisheries. The DMF assesses the status of the A/R stock annually to estimate overall abundance and fishing mortality and to establish an overall harvest limit that is intended to meet the target fishing mortality rate as specified by the ASMFC.

The current TAC for the A/R system is 550,000 lbs, split evenly between the commercial and recreational sectors, with 275,000 lbs allocated to ASMA commercial fisheries, 137,500 lbs allocated to ASMA recreational fisheries, and 137,500 lbs allocated to RRMA recreational fisheries.

2.1 Albemarle Sound Management Area Commercial Fisheries

ASMA Commercial Harvest Restrictions

The 2009 spring ASMA commercial fishery opened on 1 January and closed 30 April, for a total of 120 legal harvest days. The daily landing limit was seven fish per person per day from 1 January – 31 January, 10 fish per person per day from 1 February – 25 March, 15 fish from 26 March – 14 April, and 10 fish per person per day from 15 April – 30 April. The 2009 fall ASMA commercial fishery opened on 1 October and closed on 15 December, for a total of 76 legal harvest days. From 1 December to 15 December the only legal harvest gear was pound nets. The daily landing limit was 10 fish per person per day. Striped bass were not to exceed 50% of the total poundage of the entire finfish landings, a provision implemented to reduce directed effort towards striped bass yet allow other fisheries to harvest striped bass encountered as bycatch. An 18 in (457 mm) TL minimum size limit was also required.

ASMA Dealer Permits

During the commercial season, no commercial dealer could possess, buy, sell or offer for sale, striped bass taken from the ASMA without first obtaining a valid ASMA Dealer's Striped Bass Permit. No dealer could pack or sell striped bass without having affixed either a DMF ASMA striped bass tag or a similar tag issued by the state of origin for imported striped bass. Dealers were required to record and report daily landings to the DMF Elizabeth City office. The DMF trip ticket program also collected landings data for striped bass.

ASMA Commercial Harvest

Methods

DMF personnel had a target of 600 samples from the spring fishery and 300 samples from the fall fishery. Fish were sampled monthly from various fish houses throughout the ASMA, throughout each season. Fish were measured to the nearest mm for FL and TL and weighed to the nearest 0.01 kg. Sex was determined using the Sykes (1957) method and scales were removed from the left side of the fish, above the lateral line and between the posterior of the first dorsal fin and the insertion of the second dorsal fin. Scales were processed and aged as described in section 1.1. All data were coded on standardized DMF coding sheets and entered into the DMF biological database. Numbers of fish per year class were assigned as described in section 1.1.

Results

The spring ASMA commercial harvest was 15,904 fish weighing 60,098 lbs. A total of 650 fish was sampled from fish houses for age, TL (mm), weight (kg), and sex. A male to female ratio 1.0:1.1 was observed. The 1996-2005 year classes were

represented in the sample. The 2003-2005 year classes comprised 94% of the harvest (Table 3). Average weights and lengths are presented in Table 4. The length frequency was broadly unimodal, with the 475-575 mm TL bins comprising 81% of the sample. The largest fish sampled was in the 1,025 mm TL bin (Figure 3).

The fall ASMA commercial harvest was 8,097 fish weighing 36,036 lbs. A total of 163 fish was sampled from fish houses for age, TL (mm), weight (kg), and sex. A male to female ratio 1.0:1.7 was observed. The 1995 – 2006 year classes were represented in the sample. The 2004 – 2006 year classes comprised 81% of the harvest by number (Table 5). Average weights and lengths are presented in Table 6. The length frequency was unimodal, with the 475 – 575 mm TL bins comprising 81% of the sample. The largest fish sampled was in the 1,050 mm TL bin (Figure 4).

Total harvest for the 2009 ASMA commercial fisheries was 24,001 fish weighing 96,134 lbs.

Total striped bass losses in the ASMA commercial fisheries for the 2009 calendar year are presented in Appendix A.

ASMA Commercial Gill Net Bycatch Losses

Bycatch Estimation Methods

Bycatch losses for the ASMA commercial gill net fisheries were estimated by determining four things: 1) total gill net trips by gill net category, 2) average yards of gill net set per trip, 3) striped bass catch rates, and 4) striped bass at net mortality rates (no estimates of delayed mortality are available).

Total number of commercial gill net trips by gill net category was determined utilizing the North Carolina trip ticket program. Each time fish were sold to a licensed seafood dealer in North Carolina a trip ticket was completed. Information included on each ticket included the weight in pounds for each species sold, the gear types used (e.g., trawl, gill net, pound net, etc.), and the area fished. While the total number of gill net trips was easily obtained, assumptions were required to determine the mesh size/sizes used in each trip. Three trip categories were established: 1) flounder, 2) shad, and 3) other/small mesh. Predominant mesh sizes were then determined for each category. Based on at-sea observer coverage and gill net mesh regulations, the predominate mesh size used in the white perch, *Morone americana* fishery is the 3.25 inch stretched mesh (ISM), while 5.5 ISM is used in the flounder, *Paralichthys spp.* and 5.25 ISM used in the American shad, *Alosa sapidissima* fisheries. Assuming that size selectivity of 3.25 ISM nets would not result in substantial catches of flounder or shad, and that flounder and shad trips could be categorized based on catch characteristics, each trip was examined for species composition and assigned to one of the three designated categories based on the primary species landed. If flounder composition was greater than or equal to 10% and shad composition was less than flounder, then the target trip was equal to a flounder trip. If shad composition was greater than flounder composition or shad pounds were equal or greater than 30 lbs, then target trip was equal to a shad trip. Otherwise, the trip was equal to other/small mesh.

This procedure worked well when estimating the number of flounder trips, largely because regulations require setting gill nets during the flounder season so as to fish on

the bottom and not to exceed a vertical height of 48 in. This gear configuration has very little bycatch associated with it in the ASMA, and usually other gill net types are not fished simultaneously with the flounder gill nets, so the trip would not be lost to another category. This is not the case when estimates of trips were made for the shad and the other/small mesh category. These fisheries occur simultaneously during the shad net season and fishermen typically employ both shad nets and small mesh nets in a single trip. Although both shad nets (5.25 ISM in the ASMA) and small mesh (3.25 ISM in the majority of the ASMA) gill nets were likely used in any given trip, trips were counted as either shad or other/small mesh trips depending on the catch composition. This method of categorizing trips based on species composition had a direct effect on the distribution of discards between the shad and other/small mesh trip categories.

Sufficient at-sea commercial gill net observer data was available (all observer trips in the ASMA from 2005 – 2009 were used) to calculate yards per trip and at net mortality rates in the flounder and small mesh trip categories, except for small mesh trips during the summer months (May-October). North Carolina annually imposes mandatory net attendance for all small mesh gill net trips during the summer months due to the strong positive correlation between striped bass at net mortality and increased water temperature. Therefore, data collected through Fishery Resource Grants (FRG) researching striped bass discard mortality rates for attended gill nets in the ASMA was used in the bycatch analysis in the other/small mesh nets during the months of May through October. The maximum amount of yardage was also assumed for the shad fisheries (1,000 yds). Striped bass catch rates for all three trip categories were based on the catch rates observed in the DMF independent gill net survey (IGNS).

The number of striped bass discard losses at age was estimated from the DMF IGNS data. Numbers of discards by mesh size (large vs. other/small) were proportioned into year classes based on the composition of year classes in the 3.0 and 3.5 ISM and the 5.5 ISM nets respectively from the IGNS. The numbers were then converted into pounds based on the mean weight at age for a particular year class.

For any given category, once the number of trips, yards per trip, striped bass catch rates (# striped bass per yard of gill net), and striped bass at net mortality rates were determined; striped bass bycatch losses were calculated using the following formula:

$$B^{L} = [\, T^{\#} \times Y^{\#} \times B^{stb} \times M \,] - H$$

where B^{L} = bycatch losses, $T^{\#}$ = total number of gill net trips, $Y^{\#}$ = yards per trip, B^{stb} = bycatch of striped bass per yard of gill net, M = discard mortality, and H = harvest.

Bycatch Estimation Results

Estimated bycatch in the ASMA commercial gill net fisheries totaled 30,043 fish weighing 32,495 lbs, all of which was attributed to the small mesh gill net fisheries. There were no estimated discards from the flounder and shad commercial fisheries for 2009. When on-board commercial gill net observer data is lacking, catch rates from the DMF IGNS are used as proxies for catch rates in the commercial shad, flounder, and small mesh fisheries. Each year estimated discards in the small mesh gill net fisheries constitute the majority of total discard losses in the ASMA. This is of course due to the

fact that the majority of striped bass caught in small mesh fisheries are less than the 18 inch minimum TL size limit. If the catch rates in the small mesh nets (3.0 & 3.5 ISM) observed in the IGNS are high, estimated discards will be high as well. In 2008 the estimated discards in the small mesh commercial gill net fisheries was 69,757 fish weighing 94,487 lbs. In 2008 the catch rate in the 3.0 & 3.5 ISM nets in the IGNS was 1,596 fish for a CPUE of 5.3. This high catch rate reflected the unusually large 2005 year class (the 2005 JAI was one of the highest on record). In 2009 the catch rate in the IGNS for the 3.0 & 3.5 ISM nets was 501 fish for a CPUE of 1.9.

Likewise, catch rates from the IGNS in the 5.5 ISM net is used as a proxy for catch rates in the commercial flounder and shad gill net fisheries. The 2009 catch rate in the IGNS for the 5.5 ISM net was 16 fish for a CPUE of 0.12. This is reflective of the very poor 2003 and 2004 year classes, both of which had very low JAIs. The poor 2003 & 2004 year classes is also observed in the low commercial landings in 2008 & 2009. During fish house sampling in 2009, very few fishermen interviewed in the shad and flounder fisheries had their daily limit of striped bass, further corroborating the estimate of zero discards from these fisheries in 2009.

Until adequate funding is secured for sufficient at-sea observer coverage in the ASMA gill net fisheries, annual bycatch estimates in these fisheries should continue to be used with caution.

2.2 Albemarle Sound Management Area Recreational Fishery

ASMA Recreational Fishery Monitoring

Methods

In the fall of 2005 the Northern District of the DMF changed the design of its striped bass creel survey to more accurately reflect fishing pressure estimates and harvest estimates. This new design was the same design as used by DMF personnel for striped bass creel surveys in the Central/Southern District, and WRC personnel for striped bass creel surveys in the RRMA, allowing for a more statistically valid comparison of effort and harvest data between the various management areas.

Catch and effort data were collected through on-site interviews at boat ramps during allowed harvest days for each of four ASMA sampling zones (Figure 5). Statistics were calculated through a non-uniform probability access-point creel survey (Pollock et al. 1994). Site probabilities were set in proportion to the likely use of a site according to time of day, day of week, and season. Probabilities for this survey were assigned based on seasonal striped bass fishing pressure observed during past surveys, in addition to anecdotal information (personal communication DMF Sara Winslow and Kathy Rawls). Probabilities can be adjusted during the survey period according to angler counts to provide more accurate estimates. Morning and afternoon periods were assigned unequal probabilities of conducting interviews, with each period representing half a fishing day. A fishing day was defined as 1.5 hours after sunrise until 1.0 hour after sunset. These values varied among sites within zones due to differing fishing pressure.

Striped bass sampled during the surveys were measured for TL (mm) and weighed to the nearest 0.1 kg. No scales were collected for ageing purposes.

Estimations of age composition were based on age-length data provided by the IGNS and commercial harvest samples.

ASMA Recreational Fishery Regulations

The ASMA recreational catch is limited by an annual harvest allocation and regulated by size restrictions, creel limits, and seasonal closures. The 2009 harvest allocation of 137,500 lbs (62,500 kg) was divided between a spring season (January – April) and a fall season (October – December). The 2009 spring and fall seasons operated under a three fish per person per day creel limit. An 18 in (457 mm) TL minimum size limit was in effect for both seasons. Both seasons were open seven days a week.

Striped bass were also harvested using the DMF issued Recreational Commercial Gear License (RCGL), which allowed an individual to fish limited amounts of various commercial gears for recreational purposes. RCGL holders were constrained by the same regulations in effect for recreational fishermen and were prohibited from selling their catch. Due to funding cuts there was no harvest estimate for these license holders in 2009.

ASMA Recreational Fishery Harvest

Results

The 2009 spring ASMA recreational harvest opened on 1 January and closed on 30 April 2009, for a total of 120 legal harvest days. The entire season was open to harvest seven days a week. Total harvest was estimated at 8,164 fish weighing 22,904 lbs, with an additional 30,896 fish released. Approximately 96% of these fish were released because they were less than 18 in (457 mm) TL. There was an estimated 39,631 hours exerted targeting striped bass during the spring season. Length and weight data were collected for 296 striped bass during the spring survey. The length frequencies were broadly unimodal, with 83% of the sample in the 450-500 mm TL bins (Figure 6). The 2001-2006 year classes were represented in the sample, with the 2004-2006 year classes comprising 94% of the sample (Table 8).

The 2009 fall ASMA recreational harvest opened on 1 October and closed on 31 December 2009, for a total of 92 legal harvest days. The entire season was open to harvest seven days a week. Total harvest was estimated at 3,905 fish weighing 14,409 lbs, with an additional 9,667 fish released. Approximately 92% of the fish were released because they were less than 18 in (457 mm) TL. There was an estimated 32,390 hours exerted targeting striped bass during the fall season. Length and weight data were collected for 253 striped bass during the fall survey. The length frequencies were unimodal, with 88% of the sample in the 450-550 mm TL bins (Figure 7). The 1997 and 200 – 2006 year classes were represented in the sample, with the 2005 and 2006 year classes comprising 89% of the sample (Table 9).

Total harvest for the 2009 ASMA recreational fisheries was 12,069fish weighing 37,313 lbs. An additional 40,563 fish were released during the year. Applying a 6.4% mortality rate (Nelson 1998) to the releases, another 2,596 fish may have been removed. The average weight of a 17 in TL striped bass collected during the 2009 DMF

Independent Gill Net Survey was 2.1 lbs. This means that an additional 5,452 lbs may have been removed.

Total striped bass losses in the ASMA recreational fisheries for the 2009 calendar year are presented in Appendix A.

3. Roanoke River Management Area Fisheries

3.1 Roanoke River Management Area Recreational Fishery

RRMA Recreational Fishery Monitoring

Methods

North Carolina Wildlife Resources Commission (NCWRC) personnel used a non-uniform probability stratified access-point creel survey design (Pollock, et al. 1994) to estimate recreational fishing effort, harvest of striped bass and other species, and numbers of striped bass caught and released from the Roanoke River Management Area (RRMA) for the period 1 March through 30 April 2009. The RRMA includes the Roanoke River from Roanoke Rapids Lake dam (RM 137) downstream to Albemarle Sound as well as Cashie, Middle, and Eastmost rivers and their tributaries (Figure 8).

The survey was stratified by area (zone), time (period), and kind of day (weekdays and weekend days). The upper zone (1) includes the river segment from Roanoke Rapids Lake dam downstream to the U.S. Highway 258 bridge near Scotland Neck. The lower zone (2) extends from U.S. Highway 258 bridge downstream to Albemarle Sound. Because past experience has shown differential catch rates through progression of the open harvest season, the survey was stratified into 2-week sample periods. Within periods, fishing effort and catch is also known to vary as a function of day type so samples and estimates were further stratified by kind of day. Selection of access points where interviews occurred was based upon probability of use data generated from prior creel surveys on Roanoke River. Probability of fishing activity for time of day (0.4 for AM and 0.6 for PM during periods one and two, and equal probabilities during all other periods) was estimated based upon prior experience with the Roanoke River striped bass fishery.

During 2009, the season opened to striped bass harvest extended from 1 March to 30 April in the entire river. This unified harvest season was first implemented during the 2007 season, and represented a deviation from past years when the harvest season closed separately among zones. The intention of the unified season was to distribute angling effort among boating access areas to reduce congestion while providing additional harvest opportunities. Three-hour interview sessions were held on two weekdays and both weekend days each week in each zone when the striped bass harvest season was open. Creel clerks interviewed anglers as they completed fishing trips at boating access areas. Data collected from each fishing party interviewed included date and time of the interview, hours fished, number of anglers in the party, harvest of striped bass, hickory shad, largemouth bass and other species, number of striped bass released, bait use, and the county of residence of the anglers. Due to financial limitations, no creel survey of angling effort or the numbers of striped bass caught and released after season closure was conducted in 2009. Mean catch of striped

bass calculated from estimates derived from the 2005–2008 closed seasons was used to estimate post-harvest catch and release mortality during May 2009.

Estimates of striped bass catch and effort for each sample day were made by expanding interview data by the sample unit probability (product of the access point probability and time of day probability; Pollock et al. 1994). Within sample periods, catch and effort estimates for weekdays and weekend days were separately averaged. The averages were then expanded to the total number of days of each type for that sample period. Separate estimates of catch and effort were made for each zone.

A sample of striped bass harvested by anglers was measured individually for total length (mm), weighed (kg), and sexed. Age composition of the catch was estimated from percentages of lengths at age by sex determined from the concurrent 2009 electrofishing spawning stock assessment.

RRMA Recreational Fishery Regulations

The recreational fishery in the Roanoke River is regulated through a limited open harvest season, daily possession limits and size limits. For the 2009 season, the harvest season opened on 1 March and closed by regulation on 30 April. The daily possession limit was two fish, the minimum length limit was 18 inches (TL) and a protective slot size limit was in effect that prohibited possession of striped bass between 22 and 27 inches (TL). In addition, only one striped bass greater than 27 inches could be retained in the creel limit. Since 1997, anglers have been required to use only single, barbless hooks in zone 1 from 1 April through 30 June to reduce catch and release mortality.

RRMA Recreational Fishery Harvest and Effort

Results

During the 61-day period open to striped bass harvest, a total of 797 angler parties (1,929 anglers) were interviewed, 84% of which were fishing specifically for striped bass. From these interviews, NCWRC estimated 120,675 angler hours (SE = 18,338) were exerted specifically for striped bass. An estimated 23,248 striped bass (SE = 4,256) weighing 31,562 kg (SE = 3,755) or 69,581 lb (SE = 8,279 lb) were harvested. The 2009 recreational total allowable catch for striped bass in the RRMA was 62,369 kg (137,500 lb). During the open striped bass harvest season, an additional 124,155 striped bass (SE = 23,367) were caught and released.

In 2009, approximately 51% of the total harvest was comprised of male striped bass with the majority of these fish (80%) from the 2005 (age 4) and 2006 (age 3) year classes (Table 10). Male striped bass migrate into Roanoke River earlier in the spring (March and April) than do females normally resulting in a higher proportion of males in the catch; however, the proportion of females in the harvest was similar to males with 43% of the total harvest and 88% of the female catch comprised of age-3 and age-4 fish. The sex ratio of the harvest was skewed slightly towards females (57%) during Period 4 (the last two weeks of the harvest season) in Zone 2. The 2006 year class supported the majority of angler harvest in 2009, with 45% of all striped bass collected during the creel survey estimated to be age 3. Under the current Roanoke River striped bass

management framework, female striped bass receive additional protection from harvest through the prohibition of possession of striped bass within the protected slot length limit of 22 to 27 inches (559–686 mm) as well as by limiting the number of striped bass greater than 27 inches in length within the daily creel limit to one fish. Timing of the opening and closing of the harvest season and the protective length limits attempts to focus most harvest on three, four, and five year-old male striped bass.

Post-season monitoring data was not collected during May of 2009 due to financial limitations. The mean number of striped bass collected during the month of May for the four most recent closed season monitoring periods (2005–2008) was 38,130 fish. Combined with the estimated numbers of striped bass caught and released during the harvest season (N = 124,155), approximately 162,285 striped bass may have been caught and released in the Roanoke River during 2009. In controlled tank experiments during 1996, NCWRC biologists estimated short-term (72 hour) catch and release mortality rates for Roanoke River striped bass to be 6.4% (Nelson 1998). Applying this mortality factor to the estimated number of striped bass caught and released, an additional 10,386 fish may have been removed from the population; 7,946 during the open harvest season and 2,440 when the fishery was closed to harvest. Applying an average weight of 3.09 lb per fish harvested (period 4, Zone 2) in 2009, this equates to 24,553 lb of discard mortality during the harvest season and 7,540 lb after harvest season closure for a total of 32,093 lb. The single barbless hook regulation, angler education efforts (distribution of catch and release brochures and numerous popular articles), and the promotion of circle hook use are annual strategies used to help reduce catch and release mortality.

Total striped bass losses in the RRMA recreational fisheries for the 2009 calendar year are presented in Appendix A.

4. Required Fishery Independent Monitoring Programs

Amendment No. 5 of the Atlantic Striped Bass Fishery Management Plan established the need and guidelines for long term monitoring programs necessary for the evaluation of current management practices (ASMFC 1995). These monitoring programs are crucial in adequately determining the status of the A/R stock. North Carolina's fishery independent monitoring programs are discussed in the following section.

4.1 Juvenile Abundance Monitoring

Juvenile Abundance Monitoring

Methods

Juvenile abundance surveys were conducted from June-October 2009, and utilized beach seine and trawl gears. Beach seine sampling was conducted weekly from the first week in June through the second week of July, at nine fixed stations in western Albemarle Sound (Figure 9). A 60 ft long by 6 ft tall bag seine, with a 6 ft by 6 ft by 6 ft bag constructed of 0.25 in stretched mesh in the body and 0.125 in stretched mesh in the bag was utilized.

Trawl sampling was conducted bi-weekly from July through mid-October at seven established stations in the western Albemarle Sound and 12 established stations in the central Albemarle Sound (Figure 9). Sampling gear was a semi-balloon trawl with an 18 ft head rope, constructed of 1½ in stretched mesh webbing in the body and ½ inch stretched mesh webbing in the cod end. Tow times were 15 minutes in the western sound and 10 minutes in the central sound.

Juvenile striped bass collected were counted and if necessary a subsample (maximum of 30 per station) was measured to the nearest millimeter for fork length (FL) and total length (TL). All other species were enumerated by species and in some cases a subsample (maximum of 30 per station) was measured for FL and/or TL. Surface and bottom water temperature (°C), dissolved oxygen (mg/L), and salinity (ppt) were collected using a Yellow Springs Instruments (YSI) 85 meter. Submerged aquatic vegetation (SAV) was identified to species and/or genus.

Catch per unit effort (CPUE) from the beach seines and trawls were calculated as the number of individuals collected divided by the number of samples (either one seine or one trawl constituted a sample). Results from the western Albemarle Sound trawl survey have been utilized as the A/R striped bass stock juvenile abundance index (JAI) since 1955. The geometric mean (GM) was also calculated for the western sound trawl survey to be used in stock assessments.

All data was coded on NCDMF biological datasheets and entered into the NCDMF Biological Database.

Juvenile Abundance Monitoring

Results

Western Albemarle Sound Beach Seine Survey – 2009

Sampling resulted in the collection of 88 young of the year (YOY) striped bass in 54 seines for a CPUE of 1.6, below the long-term average of 10.3 (Table 11). Total length ranged from 30-79 mm and the mean TL increased from 40 mm on 24 June to 58 mm on 6 July. The first YOY striped bass was collected during the third week of beach seine sampling and the most were collected during the sixth week (N=61). For the entire sampling period, the most YOY striped bass were collected at the Black Walnut Point station (N=27) while two stations had zero collections. The single largest collection of YOY striped bass for the sampling season was on 6 July at the Black Walnut Point station (N=22). YOY striped bass were collected in 16 of 54 samples (Table 11).

SAV was observed at five out of the nine stations, with a total of four species present (Table 12).

Western Albemarle Sound Trawl Survey and Juvenile Abundance Index – 2009

Sampling resulted in the collection of 25 YOY striped bass in 56 trawls for a JAI of 0.4, one of the lowest values in the time series (Table 14, Figure10). Total length ranged from 45-162 mm and the mean TL increased from 61 mm on 14 July to 125 mm on 5 October. YOY striped bass were collected during six of the eight weeks of sampling, although on four weeks of sampling only one YOY was collected. The largest number of YOY striped bass collected during a single week was on 14 July (N=17). The Albemarle Beach station had the largest overall collection of YOY striped bass (N=14) while two stations had zero collections. The Albemarle Beach station also had the largest number of YOY striped bass collected in a single trawl (N=14). However, this collection was the only time striped bass were collected at the station. YOY striped bass were collected in 10 of 56 trawls (Table 13).

One possible explanation for the extremely low collections of YOY striped bass in 2009 was the flow alterations that occurred in the Roanoke River. Due to heavy rainfall in the upper Roanoke and Dan River basins, water releases of 20,000 cubic feet per second (cfs) began at Roanoke Rapids dam on 8 June 2009. Releases at 20,000 cfs continued through 19 June when releases were stepped down to 15,000 cfs, then to 10,000 cfs on 25 June, and 8,000 cfs on 29 June through 2 July. Flows returned to normal on 3 July. These flows are considered flood stage and well above the recommended flow range for successful striped bass spawning (Rulifson, 1990) and occurred at a critical time of egg/larval transport downstream. During flows this high the Roanoke River breaches its banks causing striped bass eggs and/or larvae to either become trapped in the surrounding flood plain or die due to lack of oxygen when anoxic waters from surrounding swamps inundate the river channel. It is possible that YOY striped bass did survive and the high flows simply displaced them from their usual nursery grounds where sampling takes place. This hypothesis is unlikely however, because very few YOY striped bass were encountered during NCDMF juvenile sampling for other species, which takes place all throughout the Albemarle Sound Management Area (ASMA) and its tributaries, and occurs at the same time, with the same gear as YOY striped bass sampling. The upcoming two years of the DMF IGNS should confirm or refute this year's possible failed spawn.

SAV was observed at all seven stations during trawling. There was a total of six different species observed and four stations had four or more species present (Table 12).

Central Albemarle Sound Trawl Survey – 2009

Zero YOY striped bass were collected in 84 samples during the Central Sound trawl survey in 2009 (Table 14).

SAV was observed at six of the 12 stations. There was a total of five species observed with four stations having at least two species present (Table 12).

4.2 Albemarle Sound Fishery Independent Gill Net Survey

Fall/Winter and Spring Survey

Methods

The random – stratified – multiple – mesh Independent Gill Net Survey (IGNS) began in 1990 to monitor the A/R striped bass population. The 12 different mesh sizes used allow capture of fish age one and older.

Sampling for the IGNS was conducted from 1 November – late May. Sampling gear was monofilament gill net, hung with a nine ft head rope, hung in 40-yard sections, with a hanging coefficient of 0.50. Mesh sizes were 2.5, 3.0, 3.5, 4.0 and 4.5 inch stretched mesh (ISM) with a twine size of 0.33 mm (#104), 5.0, 5.5, 6.0, 6.5, and 7.0 ISM with a twine size of 0.40 mm (#139), and 8.0 and 10.0 ISM, with a twine size of 0.57 mm (#277). Heavier twine size in the larger mesh nets was intended to improve retention of larger fish. Gill nets were hung as one of two types: floating or sinking. Six nets were tied together to form a "line". Lines of nets were one of four types: 1) large mesh float; 2) large mesh sink; 3) small mesh float; or 4) small mesh sink net. Small mesh and large mesh lines were tied together in such a way as to minimize mesh size selectivity (i.e. small mesh net order = 2.5, 3.5, 4.5, 3.0, 4.0, 5.0, and large mesh net order = 6.5, 5.5, 7.0, 6.0, 8.0, 10.0). Float nets only were constructed with a navigational fairway between the third and fourth net in each line. Each crew fished one "set" of nets, which was made up of four "lines": One line each of small mesh floats, small mesh sinks, large mesh floats, and large mesh sinks. Therefore, total number of gill nets and total length of gill net webbing fished by each crew was 24 nets equaling 960 yards of webbing.

Six sample zones in the Albemarle and Croatan Sounds were divided into one-mile square quadrants with an average of 22 quadrants per zone (Figure 11). Areas unsuitable for gill net sampling, such as marked navigational channels and areas with excessive submerged obstructions were excluded. Zones and quadrants were randomly selected to reduce bias. Alternate quadrants within each zone were randomly selected in case the primary quadrant could not be sampled due to adverse weather conditions or space limitations. In Zones II – VI, lines were set perpendicular to the shore. In Zone VII, lines were set parallel to the shore due to the substantial current associated with local tides. In quadrants that contained both shoal and deep-water areas, float and sink nets were set in each area to assure a more complete assessment of the seasonal utilization of different habitat and portions of the water column. Nets fished on the shoal areas (less than 10 ft deep) were identified as "FIN" (float net inside the shoal area) and sampled the majority of the water column. Nets fished in water deeper than 10 ft were identified as: 1) "FO" (float net offshore the shoal area) with the net fishing from the surface of the water column to the depth of the net, or, 2) "SO" (sink net offshore the shoal area) with the net fishing from bottom of the water column to the height of the net. Nets were separated to the greatest extent possible within each quadrant to eliminate interference caused by one string fishing too close to another, as well as to sample various habitat types and depths that may exist in the same quadrant

The fishing year was divided into two segments: 1) Fall/Winter (F/W) segment, 1 November through February; and 2) Spring segment, 1 March through May. The

sampling methods remained the same during each sampling segment. However, areas fished, sampling frequency, and sampling effort were altered seasonally.

During the F/W segment, two survey crews each fished one set of nets. Each crew sampled each of the six zones, providing twenty-four fishing days per month (12 per crew) and a total of 96 fishing days for the F/W season. A fishing day was defined as one crew, fishing the full set of nets, for one day (24 hours). Total gear soak time for each quadrant was 48 hours. Each 40-yard net, fished for 24 hours, was one unit of effort. Monthly effort for all mesh sizes was equal, except when nets were damaged or hampered by debris in rough weather.

During the Spring segment, gill net effort was concentrated in western Albemarle Sound (Zone II), near the mouth of the Roanoke River. The shift to Zone II was designed to increase the chance of intercepting striped bass moving through this area during their migration to the Roanoke River spawning grounds. Effort was concentrated in this zone to determine differences in the size, age, and sex composition of the spring spawning migration relative to the fall/winter resident population. Zone II was sub-divided into southern and northern areas (Figure 12). The southern area, adjacent to the Roanoke River, received increased effort at a 2:1 ratio south to north, based on the historical seasonal abundance of mature striped bass (Harriss et al. 1985). Quadrants sampled were randomly selected as previously noted. In order to effectively sample the entire spring segment, minimize lapses in effort, and eliminate simultaneous sampling, fishing effort was conducted continuously, seven days a week, with two fishing days per quad, from 1 March until the end of May.

Striped bass collected during both survey periods were counted and measured to the nearest mm for TL and FL. Scales were removed from all striped bass unless adverse weather during tagging efforts hampered a crew's ability to take them. Scales were removed from the left side of the fish, above the lateral line and between the end of the first dorsal fin and the insertion of the second dorsal fin. Sex, gut content, scales, and weight (kg) data were taken from striped bass that did not survive entanglement in the sampling gear. Sex was determined by visual inspection in the lab or when possible in the field, by applying abdominal pressure and observing the presence of milt or eggs.

Healthy striped bass were marked with an internal anchor tag. Tags were manufactured by Floy (FM-84) with a tube length of 90 mm and anchor disc dimensions of 5 mm x 15 mm. Tags were inserted in the abdominal cavity on the left side posterior to the pectoral fin. Fish were released immediately upon tagging. A letter stating the release date, location, days at large, estimated distance traveled, and length at release was sent to each person returning a tag. Also, a reward was offered of a choice of $5 or a North Carolina Striped Bass Tagging Program cap per tag. All tag returns were entered into a random drawing at year's end for three $100 rewards. Tagging activity was publicized in the media, through presentations to various organizations, and by distributing posters at marinas, ramps, tackle stores, and fish houses.

A maximum of 15 scale samples per sex per 25 mm TL size group was analyzed for age estimates (Ketchen 1950) as described in Section 1.1. Proportions within each sex and size group were calculated and expanded to the remaining sample. Weight and length at age were reported for only those individuals that were aged. Other species collected during the F/W and Spring segments were counted and subsampled for TL and/or FL. Some species were further sampled for weight, sex, maturity, and sampled

for various ageing structures. Date, weather elements, water depth (m), water temperature (°C), dissolved oxygen (mg/L), salinity (ppt), and effort parameters were recorded for each mesh/site combination. All data was coded on DMF biological datasheets and entered into the DMF Biological Database.

Fall/Winter Survey

Results

The striped bass resident and overwintering fall/winter population in the Albemarle and Croatan Sounds was monitored. The size, sex, and relative abundance of year classes were determined for the season.

Sampling resulted in 2,275 units of effort and a collection of 1,084 striped bass for a CPUE 0.48, below the series average of 0.55 (Table 15). The 2001-2007 year classes were represented in the sample. The 2005-2007 year classes comprised 93.87% of the sample, while the 2005 year class alone accounted for 53.90% of the sample (Table 16). Striped bass in the sample consisted of 284 males, 266 females, and 534 individuals of unknown sex.

The length frequency was bimodal and ranged from the 225-725 TL (mm) bins and peaked in the 425 TL (mm) bin. There was a small mode forming in the 325 TL (mm) bin representing the 2007 year class. The 2005 year class was the predominant year class represented in the 425-450 TL (mm) bins (Figure 13a).

The 2005 year class was most abundant in the F/W survey (CPUE=0.2563) followed by the 2006 (CPUE=0.1130), 2007 (CPUE=0.0778) and 2004 (CPUE=0.0229) year classes. The 2001-2003 year classes were represented by 15 fish total. The 4.0 ISM had the highest catch rates (CPUE=1.8947), followed by the 3.5 ISM (CPUE=1.2513), the 3.0 ISM (CPUE=0.9947), and the 4.5 ISM (CPUE=0.8723. The 3.5, 4.0, and 4.5 ISM accounted for 89% of the catch of the 2005 year class (Table 17).

Overall, the float offshore (FO) nets had the highest CPUE (CPUE=0.636, effort=665, catch=423), followed by the sink offshore (SO) nets (CPUE=0.607, effort=671, catch=407), and the float inshore (FIN) nets (CPUE=0.271, effort=939, catch=254). Catch rates for the predominant 2005 year class were highest in the 4.0 ISM FO nets (CPUE=2.000) followed by the 4.0 ISM SO nets (CPUE=1.926), the 3.5 ISM FO (CPUE=1.093) and 4.5 ISM SO nets (CPUE=1.037). The same trend followed for the 2006 year class where the 3.5 ISM SO (CPUE=0.852) and 4.0 ISM FO nets (CPUE=0.778) had the majority of the catch. The 2007 year class was the only year class where a FIN net dominated the catch (3.0 ISM FIN CPUE=0.659) (Figure 14).

Spring Survey

Results

The striped bass spawning stock for the A/R population was monitored. The size, sex, and relative abundance of year classes were determined for the season.

Sampling resulted in 1,559 units of effort and a collection of 1,204 striped bass for a CPUE 0.77, slightly below the series average of 0.79 (Table 15). The 1995 and 1999-2008 year classes were represented in the sample. The 2005-2007 year classes comprised 94.09% of the sample, while the 2006 year class alone accounted for 43.90% of the sample (Table 18). Striped bass in the sample consisted of 391 males, 404 females, and 409 individuals of unknown sex.

The length frequency was bimodal and ranged from the 225-1,025 TL (mm) bins and peaked in the 450 TL (mm) bin. There was a small mode forming in the 325 TL (mm) bin representing the 2007 year class. Fish in this bin increased in frequency from the F/W survey from 7% to 13%. The 2005 and 2006 year classes were represented in the 425-475 TL (mm) bins (Figure 13b).

The 2006 year class was most abundant in the spring survey (CPUE=0.3380) followed by the 2007 (CPUE=0.2527), and 2005 (CPUE=0.1360) year classes. The 1995 and 1999-2004 year classes were represented by 68 fish total. The 4.0 ISM had the highest catch rates (CPUE=2.4198), followed by the 3.0 ISM (CPUE=2.1679), the 3.5 ISM (CPUE=1.6692), and the 2.5 ISM (CPUE=1.3206). The 3.0, 4.0, and 4.5 ISM accounted for 72% of the catch of the 2005-2007 year classes (Table 19).

Catch rates by net type were noticeably different in the spring survey compared to the F/W survey. Overall, the float offshore (FO) nets had the highest CPUE (CPUE=1.178, effort=496, catch=584), followed by the float inshore (FIN) nets (CPUE=0.865, effort=591, catch=511), and the sink offshore (SO) nets (CPUE=0.231, effort=472, catch=109). Catch rates for the predominant 2006 year class were highest in the 4.0 ISM FO nets (CPUE=2.8) followed by the 3.5 ISM FO nets (CPUE=2.5). The same trend followed for the 2005 year class where the 4.0 ISM FO (CPUE=1.1) and 4.5 ISM FO nets (CPUE=1.0) had the majority of the catch. Like the F/W survey, the 2007 year class was captured predominately in FIN nets (3.0 and 2.5 ISM FIN CPUE=2.6 and 1.8 respectively) (Figure 15).

4.3 Roanoke River Management Area Striped Bass Spawning Stock Assessment

Spawning Stock Assessment

Methods

NCWRC personnel collected striped bass weekly beginning 13 April and continuing through 26 May 2009, from the Roanoke River near Weldon, North Carolina. A boat-mounted electrofishing unit (Smith-Root 7.5 GPP) was used (1 dip netter) to capture fish during daylight hours. Sampling began as the water temperature approached 13^{o}C, and ended when striped bass spawning was complete; optimum spawning temperatures range from 18^{o}–22^{o}C for striped bass in the Roanoke River. Electrofishing was conducted in the vicinity of Roanoke Rapids (river mile (RM) 137) and Weldon (RM 130), the historical spawning area for Roanoke River striped bass. Sample stations were established which were accessible on most river levels and which represented various main river channel and secondary channel habitats (strata). Sampling was conducted at stations randomly selected within strata. To minimize size selection during sampling, striped bass were netted as they were encountered regardless of size. Actual electrofishing time (seconds) was recorded for each sample station. Relative abundance of striped bass for each sample was indexed by catch-per

unit-effort (CPUE) and expressed as number of fish captured per hour (fish/h). Water temperature (^{o}C) was recorded each sample day.

Sex was determined for each captured fish by applying directional pressure to the abdomen toward the vent and observing the presence of milt or eggs. Each fish was measured for total length (mm) and weighed (kg). Scales were removed from a subsample of the fish (target maximum of 5 fish of each 25-mm size group and sex per sample day) on the left side of the fish between the lateral line and the dorsal fins.

To determine age, scales were examined at 33X magnification on a microfiche reader and annuli were counted. Proportions of each age group within each 25-mm size group were computed and expanded to the total number of fish within each size group. Mean lengths at age were calculated from lengths of aged fish only.

Spawning Stock Assessment

Results

Weekly electrofishing sampling in the Roanoke River between 13 April and 26 May 2009 yielded 4,762 striped bass, one of which was not measured and subsequently was removed from the analysis. Male striped bass accounted for 79.9% of the sample (N = 3,802) while 20.1% (N = 959) were females. Relative abundance of striped bass (pooled CPUE or □ fish collected/□ hours of electrofishing effort) for 2009 was 285.7 fish/h (Table 20). The 2009 pooled catch rate was down slightly from the 2008 estimate (321.2 fish/h). The peak in mean CPUE was observed on 21 April (536.2 fish/h; SE=166.9) at a water temperature of 16.4 ^{o} C. By 26 May 2009, striped bass CPUE had dropped markedly with increasing water temperatures and sampling ceased.

Twelve year classes of male striped bass were present in the age sample, with 16 fish $\geq$ age 9 collected from the 1997–2000 cohorts (Tables 21 and 24). Age-3 males from the 2006 year class made the highest contribution to the total catch in 2009 (48% of the total) and CPUE for this group was 138.3 fish/h (Table 21). This cohort was expected to make a significant contribution in 2009 as their abundance in 2008 (144.0 fish/h) was more than twice as high as any prior annual estimate of age-2 catch from the spawning grounds survey (Tables 22 and 23). However, the 2003–2005 cohorts (ages 4–6) were below average in abundance; age-6 striped bass CPUE was only 4.2 fish/h for males and 2.5 fish/h for females. Similarly, the 2002 cohort which had dominated the electrofishing catch from 2005–2007 was rarely collected; combined male and female CPUE of age-7 fish was only 3.2 fish/h (Table 22). Abundance of the 2006 year class (age 3) was highest for females, and contributed 8.4% of the total catch with a CPUE of 24.1 fish/h in 2009. Sixteen year classes of females (1993–2008, ages 1–16) were observed during the survey. The large numbers of young males (ages 2–4) collected each year obscures the contribution of older year classes to the spawning stock. For example, in terms of percent composition, females age 9–16 accounted for only 2.3% of the total sample (Table 24). However, 111 female striped bass $\geq$ age 9 were collected in 2009 which represented 11.6% of the female catch. The presence of these older fish demonstrates the continued age structure expansion of the Roanoke River spawning stock.

Mean length at age analysis for 2009 Roanoke River striped bass indicated that between ages 3 and 8, growth was similar for males and females and ranged from 28–

48 mm per year, with female mean length 16–25 mm higher than males at each age (Table 24). Growth rates of males and females between ages 8 and 11 were faster and more variable, ranging from 24–121 mm per year for males and 60–121 mm for females. A summarization of mean length at age for the different year classes examined since 1991 indicates minor annual variation in growth rates between year classes (Table 25). Mean weight at age data for a subsample of fish collected in 2009 is presented in Table 26; females age 8–12 were 0.5–4.1 kg heavier than males of the same cohort, and the discrepancy between sexes increased noticeably each year. Changes in spawning condition over the sampling period should be considered when analyzing mean weight at age information. Mean post-spawn weight of females collected from the Roanoke River and transported to the NC Watha State Fish Hatchery for use as broodstock was 1.9 kg less than pre-spawn values (N = 18, SE = 0.26).

The 2009 male size distribution was dominated by fish between 400 and 475 mm with a peak between 425 and 450 mm (Figure 16). Age analysis confirmed that most of these fish were age-3 fish from the 2006 year class. Beyond the early peak in the male length-frequency histogram, male striped bass size declined markedly. This pattern of rapid attrition beyond age 4 (492 mm) has continued for the Roanoke River spawning population despite the protective slot limit (559–686 mm) first implemented on recreational harvest in 1992. The continued absence of fish in the slot limit suggests limited effectiveness of this regulation. As was the case for males, the 2006 year class was strongest for females, with an early peak in the expanded, bimodal size distribution noted between 450 and 500 mm. Since 2000, the annual length-frequency distribution has contained a higher percentage of older and larger female striped bass, and a second, minor mode had become established around 900 mm. This continued to be the case in 2009 as evidenced by a broad second mode in the female distribution that began at 800 mm and extended through 1150 mm with a small peak at 925 mm. Females near the second peak were predominantly age-11 and age-12 fish from the 1997 and 1998 year classes. A total of six female striped bass from the 1993 year class (age 16) were captured in 2009. The female length-frequency histogram continued to demonstrate recruitment of larger and older striped bass to the spawning stock.

Broodstock Collection

To support North Carolina's striped bass culture program, broodstock were removed from the Roanoke River and transported to the NC Watha State Fish Hatchery for spawning; collections were made on 13, 21, and 27 April and 4 May. A total of 18 females (640–1080 mm) and 63 males (380–845 mm) were removed from the Roanoke River in 2009. Total weight was 222.9 kg (females = 156.3 kg and males = 66.6 kg) or 491.45 lb.

4.4 North Carolina Cooperative Ocean Survey

NC Cooperative Ocean Survey

Methods

A cooperative effort to tag and assess the age composition of the Atlantic migratory stock over wintering off NC has been conducted annually since the winter of 1988. This survey is conducted through joint efforts of the NMFS, Maryland Department

of Natural Resources (MDNR), US Fish and Wildlife Service (USFWS), and DMF, utilizing National Oceanic and Atmospheric Administration (NOAA) vessels. The majority of the striped bass captured were measured and tagged with USFWS internal anchor tags. Scales for ageing and TL mm were obtained from a representative portion of the oceanic migratory striped bass captured during the survey. Scales were processed as described in earlier sections. All readable scales collected from the COOP Survey were aged. Age and year class were assigned according to conventions developed by the ASMFC Striped Bass Scientific and Statistical Committee.

NC Cooperative Ocean Survey

Results

During the 2009 Cooperative Tagging Cruise, TL and age samples were taken from 142 striped bass. The 1994-2004 year classes were represented in the sample. The 1999-2002 year classes accounted for 77.5% of the sample (Table 27). The length frequencies are presented in Figure 17. Fish ranged from 568 – 1,149 mm TL.

5. Planned Management Strategies for the Current/Upcoming Calendar Year

5.1 Recreational and Commercial Fisheries Monitoring

Atlantic Ocean Recreational Fishery

North Carolina instituted a Coastal Recreational Fishing License (CRFL) in 2007 which is required by all anglers fishing in the sounds and the state territorial waters of the Atlantic Ocean (0-3 miles from shore). The goal of the license is to gain better effort data on recreational anglers in the marine and estuarine waters of the state.

There has been a requirement since 2005 that all recreational anglers report striped bass harvested in the Atlantic Ocean from the NC/Va line above Corolla, south to Ocracoke Inlet, from May through October. The purpose of this reporting requirement is to gain more accurate harvest data for recreational striped bass anglers in the Atlantic Ocean during this time. No other regulation changes are planned for the recreational fishery in the Atlantic Ocean for 2010. The daily creel limit will remain at two fish per person per day, with a minimum TL (mm) requirement of 28 in. The season will remain open all year.

Albemarle Sound Management Area Recreational Fishery

The 2010 harvest season in the ASMA was set from 1 October through 31 December (fall season) and from 1 January through 30 April (spring season). The minimum size limit was 18 in TL and the daily creel was three fish per angler. These regulations will remain in effect for 2010. The season can be closed early by proclamation if the TAC is reached.

Roanoke River Management Area Recreational Fishery

The 2010 harvest season in the RRMA was set from 1 March through 30 April in the entire river. This unified regulation will remain in effect for the 2010 season. The

minimum size limit will remain at 18 in TL, the no possession protective slot limit (22-27 in TL) will remain in effect, and only one fish over 27 in TL will be allowed in the two-fish daily creel. In the upper Roanoke from April 1 through 30 June, only a single barbless hook may be used. The season can be closed early by proclamation if the TAC is reached.

Atlantic Ocean Commercial Fisheries

There was a new regulation requiring commercial fishing license holders to declare which of the three fisheries (beach seine, gill net, or trawl) they will be participating in for 2009/2010 quota season. Once declared, they must remain in that fishery for the next three years. Bag limits will be set based on number of participants. The seasons will be opened and closed by proclamation.

Albemarle Sound Management Area Commercial Fishery

No regulation changes are proposed for the 2010 ASMA commercial fishery. The fishery will continue to be split between a spring and fall season. The harvest will continue to be limited by a daily possession limit and an 18 in (457 mm) minimum TL requirement. Fish will continue to be sampled from the fisheries as in the past. Seasons and daily bag limits may be changed by proclamation as necessary.

5.2 Fisheries Independent Monitoring Programs

Juvenile Abundance Monitoring

There are no planned changes for juvenile surveys in 2010.

Albemarle Sound Management Area Independent Gill Net Surveys

There are no planned changes for the 2010/2011 seasons.

Roanoke River Spawning Stock Assessment

There are no planned changes for the 2010 sampling season.

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Table 1. Year class composition and estimated number of striped bass harvested from the Atlantic Ocean commercial fisheries, NC, 2008/2009. Percent composition is by number.

	Male			Female			Totals		
Year Class	N	LBS	% Comp	N	LBS	% Comp	N	LBS	% Comp
2002				109	1,061	1.21	109	1,061	1.21
2001	343	4,246	3.80	777	9,553	8.60	1,120	13,799	12.40
2000	144	2,123	1.59	692	10,614	7.66	836	12,737	9.26
1999	245	4,246	2.71	826	14,860	9.15	1,071	19,106	11.85
1998	667	11,676	7.38	2,186	48,826	24.20	2,852	60,501	31.58
1997	326	7,430	3.61	1,469	35,027	16.27	1,795	42,457	19.88
1996	163	4,246	1.81	545	16,983	6.03	708	21,228	7.84
1995	159	4,246	1.77	155	5,307	1.72	315	9,553	3.48
1994				81	3,184	0.89	81	3,184	0.89
1993				101	4,246	1.12	101	4,246	1.12
1992				44	2,123	0.48	44	2,123	0.48
Totals	2,047	38,211	22.66	6,985	151,784	77.34	9,032	189,995	100.00

Note. Table may not add due to rounding.

Table 2. Year class composition of striped bass harvested during the Atlantic Ocean commercial fisheries, NC, 2008/2009. Total length and weight data are for aged fish only. Standard deviations listed in parenthesis.

			Total Length (mm)			Weight (kg)		
Year Class	N Aged	% Comp	Mean	Min	Max	Mean	Min	Max
2002	1	0.56	766			4.4		
2001	13	7.26	814 (25)	761	852	5.6 (0.4)	4.9	6.2
2000	12	6.70	864 (32)	823	932	6.9 (0.7)	5.8	8.3
1999	18	10.06	909 (52)	832	1,000	8.1 (1.3)	6.2	10.2
1998	57	31.84	959 (41)	871	1,085	9.7 (1.6)	6.2	13.6
1997	40	22.35	986 (56)	880	1,112	10.7 (1.8)	7.4	14.2
1996	20	11.17	1,046 (49)	955	1,148	13.7 (1.9)	10.6	17.6
1995	9	5.03	1,076 (51)	1,010	1,177	14.0 (2.2)	10.4	17.5
1994	3	1.68	1,146 (42)	1,103	1,187	17.9 (1.0)	16.8	18.6
1993	4	2.23	1,180 (52)	1,103	1,212	19.0 (0.9)	17.7	19.8
1992	2	1.12	1,217 (33)	1,194	1,240	22.1 (0.1)	22.0	22.1
Totals	179	100.00						

Note. Table may not add due to rounding.

Table 3. Estimated number of striped bass by year class and sex harvested during the spring commercial harvest, Albemarle Sound Management Area, NC 2009. Percent composition is by number.

	Male			Female			Totals		
Year Class	N	LBS	% Comp	N	LBS	% Comp	N	LBS	% Comp
2005	4,771	14,631	30.00	3,731	11,112	23.46	8,502	25,743	53.46
2004	2,057	8,149	12.93	2,363	9,538	14.86	4,420	17,687	27.79
2003	797	3,889	5.01	1,213	5,834	7.63	2,010	9,723	12.64
2002	298	1,667	1.87	327	1,852	2.06	625	3,519	3.93
2001	133	926	0.84	80	556	0.51	214	1,482	1.34
2000	18	185	0.11	20	185	0.13	38	370	0.24
1999	32	370	0.20	11	185	0.07	43	556	0.27
1998	6	93	0.04	30	556	0.19	36	648	0.23
1997				13	278	0.08	13	278	0.08
1996				3	93	0.02	3	93	0.02
Totals	8,112	29,910	51.01	7,791	30,188	48.99	15,904	60,098	100.00

Note. Table may not add due to rounding.

Table 4. Year class composition, total length (mm) and weight (kg) data for striped bass sampled from the spring commercial harvest, Albemarle Sound Management Area, NC 2009. Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

					Total Length (mm)			Weight (kg)		
Year Class	N Aged	N Expanded	N Total	% Comp	Mean	Min	Max	Mean	Min	Max
Male										
2005	39	119	158	24.31	485 (23)	450	525	1.34 (0.27)	1.03	1.82
2004	26	62	88	13.54	525 (29)	466	579	1.67 (0.30)	1.10	2.20
2003	23	20	43	6.62	572 (24)	527	610	2.13 (0.31)	1.49	2.72
2002	17	1	18	2.77	603 (26)	564	657	2.56 (0.34)	1.99	3.01
2001	10	0	10	1.54	635 (35)	596	695	3.15 (0.47)	2.54	3.85
2000	2	0	2	0.31	748 (14)	738	758	4.70 (0.71)	4.20	5.20
1999	4	0	4	0.62	781 (25)	758	804	5.27 (0.72)	4.27	5.80
1998	1	0	1	0.15	840			7.4		
Female										
2005	44	76	120	18.46	491 (23)	459	550	1.32 (0.26)	0.99	1.94
2004	29	74	103	15.85	546 (26)	474	591	1.91 (0.29)	1.02	2.80
2003	22	41	63	9.69	582 (20)	535	617	2.32 (0.26)	1.80	2.89
2002	12	8	20	3.08	621 (11)	608	650	2.79 (0.36)	2.21	3.31
2001	5	1	6	0.92	665 (25)	630	691	3.28 (0.49)	2.70	4.00
2000	2	0	2	0.31	736 (71)	685	786	4.16 (0.08)	4.10	4.22
1999	2	0	2	0.31	843 (18)	830	856	7.87 (1.22)	7.00	8.73
1998	6	0	6	0.92	893 (20)	866	925	8.37 (0.37)	8.00	9.00
1997	3	0	3	0.46	958 (49)	930	1,015	9.63 (2.32)	7.70	12.20
1996	1	0	1	0.15	1,025			12.70		
Totals	248	402	650	100.00						

Note. Table may not add due to rounding.

Table 5. Estimated number of striped bass by year class and sex harvested during the fall commercial harvest, Albemarle Sound Management Area, NC 2009. Percent composition is by number.

	Male			Female			Totals		
Year Class	N	LBS	% Comp	N	LBS	% Comp	N	LBS	% Comp
2006	749	763	9.25	515	1,423	6.36	1,264	2,185	15.61
2005	1,404	4,233	17.34	1,591	5,543	19.65	2,995	9,776	36.99
2004	515	2,010	6.36	1,779	7,915	21.96	2,293	9,925	28.32
2003	281	1,409	3.47	374	1,771	4.62	655	3,180	8.09
2002	187	1,093	2.31	94	838	1.16	281	1,931	3.47
2001	47	237	0.58	94	1,022	1.16	140	1,259	1.73
2000			0.00	140	1,506	1.73	140	1,506	1.73
1999	47	495	0.58	47	598	0.58	94	1,094	1.16
1998			0.00	94	1,857	1.16	94	1,857	1.16
1997	47	1,063	0.58			0.00	47	1,063	0.58
1996			0.00	47	1,104	0.58	47	1,104	0.58
1995			0.00	47	1,156	0.58	47	1,156	0.58
Totals	3,276	11,303	40.46	4,821	24,733	59.54	8,097	36,036	100.00

Note. Table may not add due to rounding.

Table 6. Year class composition, total length (mm) and weight (kg) data for striped bass sampled from the fall commercial harvest, Albemarle Sound Management Area, NC 2009. Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

					Total Length (mm)			Weight (kg)		
Year Class	N Aged	N Expanded	N Total	% Comp	Mean	Min	Max	Mean	Min	Max
Male										
2006	6	0	6	3.68	480 (20)	455	500	1.28 (0.27)	1.00	1.70
2005	26	4	30	18.40	502 (20)	467	545	1.40 (0.27)	0.93	2.30
2004	10	1	11	6.75	535 (14)	507	555	1.80 (0.24)	1.40	2.25
2003	5	1	6	3.68	588 (7)	580	600	2.35 (0.25)	2.10	2.70
2002	4	0	4	2.45	623 (55)	577	703	2.65 (0.78)	2.13	3.80
2001	1	0	1	0.61	670			2.30		
1999	1	0	1	0.61	820			4.80		
1997	1	0	1	0.61	980			10.30		
Female										
2006	11	0	11	6.75	490 (16)	469	509	1.25 (0.24)	1.00	1.69
2005	24	10	34	20.86	519 (18)	476	566	1.61 (0.25)	1.10	1.98
2004	26	12	38	23.31	562 (17)	536	600	2.08 (0.27)	1.72	2.68
2003	8	0	8	4.91	605 (24)	558	629	2.15 (0.32)	1.60	2.60
2002	2	0	2	1.23	686 (21)	671	700	4.06 (1.33)	3.12	5.00
2001	2	0	2	1.23	741 (21)	726	755	4.95 (0.35)	4.70	5.20
2000	3	0	3	1.84	767 (25)	745	795	4.87 (0.23)	4.60	5.00
1999	1	0	1	0.61	885			5.8		
1998	2	0	2	1.23	907 (80)	850	963	9.00 (2.26)	7.40	10.60
1996	1	0	1	0.61	990			10.70		
1995	1	0	1	0.61	1,055			11.2		
Totals	135	28	163	100.00						

Note. Table may not add due to rounding.

Table 7. Estimated year class composition, numbers, and pounds of striped bass discard mortality resulting from bycatch in the ASMA gill net fisheries, NC, 2009. Percent composition is by number.

Fishery	Year Class	N	Percent (N)	Pounds	Percent (lbs)
Flounder					
	N/A	0	0	0	0
Total		0	0.00	0	0.00
Shad					
	N/A	0	0.00	0	0.00
Total		0	0.00	0	0.00
Small/other					
	2007	21,659	72.09	15,567	47.90
	2006	7,712	25.67	15,048	46.31
	2005	654	2.18	1,816	5.59
	2004	18	0.06	65	0.20
Total		30,043	100.00	32,495	100.00
Grand Total		**30,043**	100.00	**32,495**	100.00

Table 8. Estimated number of striped bass by year class harvested during the spring Albemarle Sound Management Area recreational fishery, NC. 2009.

Year class	% Contribution	N
2006	16.41	1,340
2005	63.00	5,143
2004	14.15	1,155
2003	4.36	356
2002	1.59	129
2001	0.50	41
Totals	100.00	8,164

Note. Table may not add due to rounding.

Table 9. Estimated number of striped bass by year class harvested during the fall Albemarle Sound Management Area recreational fishery, NC. 2009.

Year class	% Contribution	N
2006	58.89	2,300
2005	30.00	1,172
2004	5.56	217
2003	2.37	93
2002	1.19	46
2001	1.19	46
2000	0.40	15
1997	0.40	15
Totals	100.00	3,905

Note. Table may not add due to rounding.

Table 10. Estimated number of striped bass by year class and sex harvested during the spring Roanoke River Management Area recreational fishery, NC, 2009. N represents the number of angler-harvested striped bass measured in the creel survey, and then partitioned into age groups with the length-at-age key derived from the spawning stock electrofishing survey.

Sex and Year Class	Age	N Measured	Percent Composition	Estimated Number in Recreational Harvest
Males				
2006	3	169	16.19	3,763
2005	4	259	24.81	5,768
2004	5	86	8.24	1,915
2003	6	20	1.91	445
	Total	**534**	**51.15**	**11,891**
Females				
2007	2	1	0.10	22
2006	3	239	22.89	5,322
2005	4	210	20.11	4,676
2004	5	51	4.89	1,136
2003	6	7	0.67	156
2002	7	0	0	0
2001	8	0	0	0
2000	9	2	0.19	45
	Total	**510**	**48.85**	**11,357**
	Grand Total	**1,044**	**100.00**	**23,248**

Table 11. Number, mean TL (mm), and range TL (mm) of striped bass young-of-year collected during weekly beach seines in western Albemarle Sound, NC, 2009.

2009	Date						
Calendar Week	22	23	24	25	26	27	
Station	1 Jun	8 Jun	15 Jun	22Jun	29 Jun	6 Jul	Totals
Albemarle Boat Plant (163S)	0	0	1	0	0	1	2
Cape Colony (153S)	0	0	0	0	1	10	11
Edenton Bay (49S)	0	0	0	2	5	11	18
Chowan River Bridge (46S)	0	0	1	0	0	15	16
Black Walnut Point (139S)	0	0	0	0	5	22	27
Avoca Farm (162S)	0	0	0	3	8	1	12
Batchelor Bay (128S)	0	0	0	0	1	1	2
Albemarle Beach (152S)	0	0	0	0	0	0	0
West of Mackey's (129S)	0	0	0	0	0	0	0
Totals	0	0	2	5	20	61	88
Mean TL mm			40	47	54	58	56
Range TL mm			30-49	38-65	37-79	45-79	30-79
CPUE	0.0	0.0	0.2	0.6	2.2	6.8	1.6

Long term average = 10.3

Table 12. Submerged aquatic vegetation (SAV) and macro-algae observed during juvenile striped bass sampling, Albemarle Sound, NC, 2009.

Station	Common Name	Scientific Name
Beach Seines		
Albemarle Beach	None observed	
Avoca Farm	Naiad	*Najas guadalupensis*
	Water Weed	*Elodea spp.*
	Wild Celery	*Vallisneria americana*
Batchelor Bay	Naiad	*Najas guadalupensis*
	Wild Celery	*Vallisneria americana*
Black Walnut Point	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Wild Celery	*Vallisneria americana*
Cape Colony	Coontail	*Ceratophyllum demersum*
	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Water Weed	*Elodea* spp.
	Widgeon	*Ruppia maritima*
	Wild Celery	*Vallisneria americana*
Albemarle Boat Plant	Coontail	*Ceratophyllum demersum*
	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Widgeon	*Ruppia maritima*
	Wild Celery	*Vallisneria americana*
Chowan River Bridge	None observed	
Edenton Bay	Naiad	*Najas guadalupensis*
	Water Weed	*Elodea* spp.
	Wild Celery	*Vallisneria americana*
West of Mackey's	None observed	
Western Sound Trawls	Coontail	*Ceratophyllum demersum*
Albemarle Beach	Coontail	*Ceratophyllum demersum*
	Redhead	*Potamogeton perfoliatus*
	Water Weed	*Elodea* spp.
	Widgeon	*Ruppia maritima*
	Wild Celery	*Vallisneria americana*
Bateman's Beach	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
Black Walnut Point	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Wild Celery	*Vallisneria americana*
Bluff Point	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Widgeon	*Ruppia maritima*
Brickhouse	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Widgeon	*Ruppia maritima*
	Wild Celery	*Vallisneria americana*

Table 12. Continued.

Station	Common Name	Scientific Name
Cape Colony	Coontail	*Ceratophyllum demersum*
	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Water Weed	*Elodea* spp.
	Widgeon	*Ruppia maritima*
	Wild Celery	*Vallisneria americana*
George's Beach	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Widgeon	*Ruppia maritima*
	Wild Celery	*Vallisneria americana*
Central Sound Trawls		
Alligator River Mouth	Naiad	*Najas guadalupensis*
Barge Target	Widgeon	*Ruppia maritima*
Big Flatty Creek	Naiad	*Najas guadalupensis*
	Widgeon	*Ruppia maritima*
Bull Bay	Widgeon	*Ruppia maritima*
Coast Guard Base	None observed	
Dewey Pier	Widgeon	*Ruppia maritima*
Harvey Point	Redhead	*Potamogeton perfoliatus*
	Widgeon	*Ruppia maritima*
Holiday Island	Millfoil	*Myriophyllum spicatum*
	Naiad	*Najas guadalupensis*
	Redhead	*Potamogeton perfoliatus*
	Widgeon	*Ruppia maritima*
	Wild Celery	*Vallisneria americana*
Laurel Point	None observed	
Little River	Redhead	*Potamogeton perfoliatus*
	Widgeon	*Ruppia maritima*
Mid-Sound	None observed	
Pasquotank River Mouth	None observed	

Table 13. Number, mean TL (mm), and range TL (mm) of striped bass young-of-year collected during bi-weekly trawls in western Albemarle Sound, NC, 2009.

2009	Date								
Calendar Week	28	30	32	34	36	38	40	42	
Station	14 Jul	27 Jul	10 Aug	24 Aug	8 Sept	22 Sept	5 Oct	19 Oct	Totals
Brickhouse (149)	1	0	0	0	0	0	1	0	2
Nixon's Beach (137)	0	0	0	0	0	0	0	0	0
Georges Beach (150)	0	0	0	0	0	0	0	0	0
Batemans Beach (151)	0	0	0	0	1	3	0	0	4
Albemarle Beach (152)	14	0	0	0	0	0	0	0	14
Black Walnut Point (139)	1	0	0	1	0	1	0	0	3
Cape Colony (153)	1	1	0	0	0	0	0	0	2
Totals	17	1	0	1	1	4	1	0	25
Mean TL mm	61	60	0	87	130	136	125	0	78
Range TL mm	45-81	60	0	87	130	110-162	125	0	45-162
CPUE	2.4	0.1	0.0	0.1	0.1	0.6	0.1	0.0	0.4

Long term average = 8.4

2009 JAI = 0.4

Table 14. Catch per unit effort and geometric mean for striped bass collected in young-of-year surveys, Albemarle Sound NC, 1955 - 2009.

Year	Western Sound Trawls	Western Sound Geometric Mean	Central Sound Trawls	Western Sound Beach Seine
1955	3.3			
1956	19.1			
1957	5.7			
1958	0.2			
1959	23.9			
1960	5.9			
1961	10.3			
1962	7.9			
1963	4.8			
1964	3.1			
1965	10.1			
1966	3.5			
1967	23.4			
1968	6.6			
1969	3.0			
1970	12.5			
1971	2.9			
1972	2.5			
1973	2.0			
1974	5.5			
1975	10.8			
1976	10.5			
1977	3.6			
1978	0.6			
1979	0.6			
1980	0.5			
1981	0.1			
1982	3.8	0.5		
1983	0.8	0.4		
1984	0.4	0.1	0.2	
1985	1.2	0.1	0.0	
1986	0.1	0.1	0.0	
1987	0.1	0.2	0.2	
1988	4.1	1.3	0.5	
1989	4.3	2.0	3.7	
1990	1.4	0.6	0.3	
1991	0.9	0.4	0.1	
1992	2.6	0.7	0.4	
1993	44.5	17.3	12.4	20.9
1994	38.2	14.9	8.5	37.1
1995	9.9	3.1	3.0	2.4
1996	31.5	9.8	33.9	39.5
1997	5.4	1.7	4.3	12.4
1998	7.0	2.8	3.9	1.2
1999	0.8	0.5	0.1	0.1
2000	58.8	20.0	38.5	30.2
2001	3.3	1.3	1.8	1.9
2002	7.3	2.1	0.1	1.7
2003	0.3	0.2	0.1	0.2
2004	1.7	0.8	3.9	2.3
2005	34.6	9.5	12.8	12.3
2006	3.0	1.4	0.1	1.5
2007	7.2	2.3	0.5	4.5
2008	6.6	1.4	0.3	5.1
2009	0.4	0.2	0.0	1.6
Mean	8.4	3.4	5.0	10.3

Table 15. Catch per unit effort (CPUE) of striped bass from the fall/winter and spring Independent Gill Net Surveys, conducted in the Albemarle and Croatan Sounds, 1990 – 2009.

F/W Segment	Effort	N	CPUE	Spring Segment	Effort	N	CPUE
1990/91	1,469	1,396	0.95	1991	1,964	2,084	1.06
1991/92	2,483	1,093	0.44	1992	2,330	1,091	0.47
1992/93	2,286	899	0.39	1993	2,230	614	0.28
1993/94	2,302	985	0.43	1994	2,032	413	0.20
1994/95	2,274	1,621	0.71	1995	1,950	1,989	1.02
1995/96	2,259	715	0.32	1996	1,883	1,227	0.65
1996/97	2,291	1,479	0.65	1997	1,925	1,707	0.88
1997/98	2,256	1,225	0.54	1998	1,909	1,961	1.02
1998/99	2,292	2,196	0.96	1999	1,991	2,302	1.16
1999/00	2,274	1,129	0.50	2000	2,011	1,829	0.91
2000/01	2,275	844	0.37	2001	1,867	1,789	0.96
2001/02	2,266	1,131	0.50	2002	1,850	1,623	0.88
2002/03	2,289	736	0.32	2003	2,166	884	0.41
2003/04	2,208	1,745	0.79	2004	1,948	1,886	0.97
2004/05	2,256	1,104	0.49	2005	1,964	1,451	0.74
2005/06	2,271	1,422	0.63	2006	1,934	1,906	0.99
2006/07	2,264	482	0.21	2007	1,923	973	0.51
2007/08	2,235	1,752	0.78	2008	1,801	2,417	1.34
2008/09	2,275	1,084	0.48	2009	1,559	1,204	0.77
Average	2,238	1,213	0.54		1,960	1,545	0.79

Table 16. Year class composition, total length (mm), and weight (kg) data from a subsample of striped bass collected during the fall/winter Independent Gill Net Survey, Albemarle Sound, NC, 2008/2009. Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

					Total Length (mm)			Weight (kg)		
Year Class	N Aged	N Expanded	N Total	% Comp	Mean	Min	Max	Mean	Min	Max
Male										
2007	34	4	38	3.51	327 (28)	260	381	0.38 (0.08)	0.19	0.63
2006	30	56	86	7.92	397 (21)	325	428	0.70 (0.12)	0.38	0.90
2005	38	111	149	13.79	458 (37)	401	609	1.11 (0.31)	0.64	2.41
2004	7	3	10	0.89	523 (48)	470	589	1.61 (0.42)	1.11	2.28
2003	1	0	1	0.09	597			2.24		
Female										
2007	34	1	35	3.23	315 (20)	277	353	0.34 (0.07)	0.07	0.22
2006	26	31	57	5.29	405 (19)	372	454	0.73 (0.13)	0.46	1.1
2005	56	110	166	15.29	467 (34)	403	572	1.15 (0.27)	0.73	2.14
2004	4	0	4	0.37	560 (26)	530	584	1.97 (0.26)	1.7	2.2
2003	2	0	2	0.18	572 (47)	539	605	1.92 (0.32)	1.69	2.14
2002	2	0	2	0.18	647 (17)	635	659	2.91 (0.28)	2.71	3.11
Unknown										
2007	44	59	103	9.50	323 (36)	235	374			
2006	8	106	114	10.52	386 (42)	355	478			
2005	16	253	269	24.82	499 (14)	469	517			
2004	22	16	38	3.51	526 (32)	480	578			
2003	2	7	9	0.83	609 (5)	605	612			
2001	1	0	1	0.09	725					
Totals	327	757	1,084	100.00						

Table 17. Units of effort, catch, and CPUE by mesh size and year class of striped bass collected in the fall/winter Independent Gill Net Survey, Albemarle and Croatan Sounds, NC, 2008/2009.

		Year Class																
		2007		2006		2005		2004		2003		2002		2001		Totals		
Mesh Size	Units of Effort	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE	Average (min-max) TL (mm)	N	CPUE
2.5	191	64	0.3351	18	0.0942	10	0.0524									338 (235-465)	92	0.4817
3.0	190	84	0.4421	56	0.2947	46	0.2421	3	0.0158							383 (295-488)	189	0.9947
3.5	191	28	0.1466	94	0.4921	111	0.5812	6	0.0314							418 (331-558)	239	1.2513
4.0	190	1	0.0053	86	0.4526	266	1.4000	6	0.0316	1	0.0053					439 (346-539	360	1.8947
4.5	188			3	0.0160	140	0.7447	18	0.0957	3	0.0160					469 (410-546)	164	0.8723
5.0	188					8	0.0426	10	0.0532	3	0.0160	1	0.0053			537 (464-635)	22	0.1170
5.5	188							9	0.0479	3	0.0160					564 (491-612)	12	0.0638
6.0	189					2	0.0106			1	0.0053	1	0.0053	1	0.0053	582 (440-725)	5	0.0265
6.5	187									1	0.0053					621	1	0.0053
7.0	189																	
8.0	192																	
10.0	192																	
Totals	2,275	177	0.0778	257	0.1130	583	0.2563	52	0.0229	12	0.0053	2	0.0009	1	0.0004		1,084	0.4765

Table 18. Year class composition, total length (mm), and weight (kg) data taken from a subsample of striped bass collected during the spring Independent Gill Net Survey conducted in the western Albemarle Sound, NC, 2009. Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

					Total Length (mm)			Weight (kg)		
Year Class	N Aged	N Expanded	N Total	% Comp	Mean	Min	Max	Mean	Min	Max
Male										
2007	57	38	95	7.92	328 (27)	275	376	0.36 (0.09)	0.21	0.60
2006	45	140	185	15.39	426 (25)	383	494	0.90 (0.18)	0.58	1.31
2005	27	55	82	6.78	481 (20)	447	517	1.26 (0.19)	1.00	1.66
2004	13	2	15	1.20	524 (18)	502	561	1.70 (0.16)	1.48	2.00
2003	7	0	7	0.58	544 (26)	492	571	1.85 (0.30)	1.48	2.21
2002	1	0	1	0.08	651			3.47		
2001	3	0	3	0.25	685 (17)	670	703	3.97		
2000	2	0	2	0.17	797 (13)	787	806	7.40		
1999	1	0	1	0.08	811			7.60		
Female										
2007	64	92	156	12.96	329 (34)	268	439	0.37 (0.12)	0.20	0.87
2006	48	115	163	13.57	432 (27)	380	484	.087 (0.18)	0.36	1.20
2005	28	39	67	5.56	493 (16)	468	522	1.26 (0.12)	1.01	1.46
2004	9	1	10	0.81	536 (20)	517	582	1.58 (0.41)	1.39	2.55
2003	3	0	3	0.25	573 (36)	537	619	2.03 (0.34)	1.61	2.37
2002	2	0	2	0.17	651 (57)	596	710	3.70 (0.16)	3.59	3.81
2001	1	0	1	0.08	636			2.87		
2000	1	0	1	0.08	817					
1995	1	0	1	0.08	1,043			11.25		
Unknown										
2008	3		3	0.25	250 (9)	244	260	0.29 (0.19)	0.15	0.42
2007	9	134	143	11.91	277 (15)	260	299	0.25 (0.03)	0.22	0.28
2006	4	176	180	14.94	383 (5)	375	386			
2005	2	60	62	5.15	484 (7)	479	489			
2004	6	4	10	0.84	531 (6)	525	542			
2003	4	3	7	0.56	577 (32)	548	618			
2002	3	0	3	0.25	631 (37)	605	657			
2001	1	0	1	0.08	730					
Totals	345	859	1,204	100.00						

Table 19. Units of effort, catch, and CPUE by mesh size and year class of striped bass collected in the spring Independent Gill Net Survey, western Albemarle Sound, NC, 2009.

		Year Class											
		2008		2007		2006		2005		2004		2003	
Mesh Size	Units of Effort	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE
2.5	131	3	0.0229	150	1.1450	16	0.1221	3	0.0229			1	0.0076
3.0	131			215	1.6412	58	0.4427	11	0.0840				
3.5	130			25	0.1923	174	1.3385	17	0.1308	1	0.0077		
4.0	131			1	0.0076	240	1.8321	70	0.5344	6	0.0458		
4.5	130			3	0.0231	34	0.2615	90	0.6923	8	0.0615	3	0.0231
5.0	131					5	0.0382	19	0.1450	12	0.0916	4	0.0305
5.5	130							2	0.0154	8	0.0615	5	0.0385
6.0	129											2	0.0155
6.5	126												
7.0	131											2	0.0153
8.0	129												
10.0	130												
Totals	1,559	3	0.0019	394	0.2527	527	0.3380	212	0.1360	35	0.0225	17	0.0109

		Year Class										Totals		
		2002		2001		2000		1999		1995				
Mesh Size	Units of Effort	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE	Average (min-max) TL (mm)	N	CPUE
2.5	131											327 (244-551)	173	1.3206
3.0	131											360 (301-488)	284	2.1679
3.5	130											424 (327-525)	217	1.6692
4.0	131											449 (335-582)	317	2.4198
4.5	130											475 (306-549)	138	1.0615
5.0	131					1	0.0076					506 (422-817)	41	0.3130
5.5	130			1	0.0077							553 (504-682)	16	0.1231
6.0	129	2	0.0155	2	0.0155							641 (571-710)	6	0.0465
6.5	126			1	0.0079					1	0.0079	887 (730-1,043)	2	0.0159
7.0	131	4	0.0305	1	0.0076	1	0.0076					649 (557-787)	8	0.0611
8.0	129					1	0.0078	1	0.0078			809 (806-811)	2	0.0155
10.0	130												0	0.0000
Totals	1,559	6	0.0038	5	0.0032	3	0.0019	1	0.0006	1	0.0006		1,204	0.7723

Table 20. Daily Pooled CPUE (total catch/total effort) and mean CPUE of striped bass collected by electrofishing on the Roanoke River spawning grounds during 2009. A total of 8 sites were electrofished during each daily sampling event. Total Pooled CPUE (total catch year/total effort year) and Total Mean CPUE (Average Pooled CPUE over the 8 weekly sample dates) are also provided. Standard errors are in parentheses.

Date	Effort (h)	Catch	Pooled CPUE	Mean CPUE	Water Temp (C)
13 April	2.26	300	132.60	128.41 (56.18)	13.6
21 April	2.44	1,359	556.02	536.24 (166.90)	16.4
27 April	2.84	1,103	388.84	363.87 (134.55)	18.8
4 May	2.49	690	276.61	238.58 (81.33)	19.5
11 May	2.24	754	337.03	267.91 (118.32)	21.0
18 May	2.45	462	188.72	148.52 (59.53)	20.0
26 May	1.95	94	48.27	46.95 (11.49)	21.5
Totals	**16.67**	**4762**	**285.65**	**275.44 (22.82; N = 7)**	

Table 21. CPUE (fish/h) of 16 striped bass year classes collected by electrofishing on the Roanoke River spawning grounds, 2009. Length-at-age keys from a subsample were used to determine catch at age, 4,761 fish were measured.

Year Class	Age	Sex	CPUE
2008	1	Male	2.46
		Female	0.30
2007	2	Male	37.61
		Female	3.36
2006	3	Male	138.27
		Female	24.11
2005	4	Male	30.95
		Female	13.56
2004	5	Male	11.10
		Female	4.92
2003	6	Male	4.20
		Female	2.46
2002	7	Male	1.80
		Female	1.38
2001	8	Male	0.72
		Female	0.78
2000	9	Male	0.36
		Female	1.14
1999	10	Male	0.36
		Female	0.96
1998	11	Male	0.12
		Female	1.86
1997	12	Male	0.12
		Female	0.42
1996	13	Male	0.00
		Female	0.72
1995	14	Male	0.00
		Female	0.90
1994	15	Male	0.00
		Female	0.30
1993	16	Male	0.00
		Female	0.36
Totals		**Males**	**228.07**
		Females	**57.53**
		Overall Pooled	**285.60**

Table 22. CPUE (fish/h) of striped bass year classes collected by electrofishing on the Roanoke River spawning grounds, 2001-2009.

Year Class	Sex	Sample Year 2001	2002	2003	2004	2005	2006	2007	2008	2009
2008	M									2.5
	F									0.3
2007	M								3.3	37.6
	F								0.3	3.4
2006	M							2.4	143.9	138.3
	F							0.1	8.9	24.1
2005	M						1.2	12.9	93.7	31.0
	F						0.1	1.7	10.8	13.6
2004	M					0.1	13.4	35.4	23.3	11.1
	F					0.0	8.6	1.4	3.0	4.9
2003	M					11.6	36.4	40.2	7.2	4.2
	F					0.5	13.6	9.3	1.8	2.5
2002	M			0.6	9.2	138.4	161.5	67.7	6.0	1.8
	F			0.0	0.4	32.4	29.5	16.9	3.7	1.4
2001	M		4.8	66.1	91.1	81.2	40.3	10.3	2.4	0.7
	F		0.0	0.15	12.7	13.1	10.1	7.0	1.4	0.8
2000	M	<0.1	6.9	50.7	19.3	21.9	12.7	3.4	0.7	0.4
	F	0.0	0.8	3.4	4.4	7.8	4.7	2.3	0.9	1.1
1999	M	23.4	49.2	66.9	8.1	11.7	5.6	2.6	0.9	0.4
	F	0.0	3.3	12.6	4.0	5.0	3.5	1.4	0.8	1.0
1998	M	153.3	104.6	24.1	7.4	3.2	1.8	1.6	0.4	0.1
	F	23.5	6.4	9.7	4.3	3.2	2.3	1.4	1.1	1.9
1997	M	86.9	50.2	8.1	1.6	1.7	1.1	0.3	0.2	0.1
	F	13.3	6.1	7.4	2.9	1.8	1.6	1.7	1.1	0.4
1996	M	36.3	26.7	5.0	0.8	0.3	0.7	0.3	0.4	0.0
	F	6.5	6.4	5.7	1.5	1.1	2.3	2.2	1.4	0.7
1995	M	14.8	12.6	2.4	1.1	0.3	0.3	0.1	0.0	0.0
	F	3.9	4.2	2.9	2.7	2.1	5.1	1.3	1.6	0.9
1994	M	5.1	5.7	1.0	0.9	0.3	0.1	0.0	0.0	0.0
	F	2.7	3.2	3.6	4.0	1.2	2.5	0.8	1.2	0.3
1993	M	2.6	3.5	1.3	0.4	0.1	0.1	0.0	0.0	0.0
	F	1.0	3.4	3.6	3.0	0.8	0.4	0.4	0.6	0.4
1992	M	1.0	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0
	F	1.6	2.8	1.9	0.4	0.2	0.1	0.1	0.1	0.0
1991	M	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	F	1.0	0.9	0.6	0.4	0.0	0.0	0.1	0.1	0.0
1990	M	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	F	0.5	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0
1989	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	F	0.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1988	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	F	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total		**378.3**	**303.9**	**278.3**	**180.9**	**339.9**	**359.5**	**225.3**	**321.2**	**285.6**

Table 23. CPUE (fish/h) of striped bass year classes collected by electrofishing on the Roanoke River spawning grounds, 1991-2000.

Year Class	Sex	Sample Year 1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1999	M										1.4
	F										0.0
1998	M									0.2	21.0
	F									0.0	0.2
1997	M								1.3	14.8	67.7
	F								0.0	1.1	7.5
1996	M								36.2	75.0	33.0
	F								1.2	6.0	8.4
1995	M						0.1	65.2	75.6	33.8	8.0
	F						0	0.4	4.9	4.2	2.5
1994	M						4.9	52.1	37.6	9.6	6.5
	F						0	7.6	11.1	4.7	1.9
1993	M					12.7	34.7	21.6	11.8	4.7	1.8
	F					3.4	0.9	4.0	7.2	1.7	0.6
1992	M				1.2	4.5	13.8	5.9	4.7	1.4	0.8
	F				0.1	0.6	1.0	4.0	3.4	0.9	0.8
1991	M			1.3	9.6	6.4	10.8	6.8	1.6	1.1	0.2
	F			<0.1	1.0	0.6	2.5	3.9	2.3	1.9	0.3
1990	M		10.7	23.6	45.4	25.4	8.6	2.9	0.7	0.3	0.0
	F		0.2	2.4	17.5	6.6	4.7	2.3	2.2	0.6	0.2
1989	M	68.6	88.2	32.8	62.3	28.3	1.7	0.9	0.1	0.2	0.0
	F	4.8	10.3	21.5	28.9	10.1	1.3	1.3	1.1	0.3	0.1
1988	M	16.1	9.9	1.6	1.1	0.9	0	0.1	0.0	0.0	0.0
	F	10.1	4.6	1.6	3.5	1.7	0.3	0.5	0.5	0.0	0.0
1987	M	0.9	0.4	<0.1	0	0.1	0	0	0	0	0
	F	0.9	0.8	<0.1	1.1	0.1	0.1	0.2	0	0	0
1986	M	0.4	0.2	<0.1	0	0	0	0	0	0	0
	F	0.3	<0.1	<0.1	0.2	<0.1	0	0.2	0	0	0
1985	M	0.2	0.2	0	0	0	0	0	0	0	0
	F	0.3	<0.1	<0.1	0.1	0	0	0	0	0	0
1984	M	0.1	0.2	0	0	0	0	0	0	0	0
	F	0.5	0.2	<0.1	0.1	0	0	0	0	0	0
1983	M	<0.1	<0.1	<0.1	0	0	0	0	0	0	0
	F	0.3	0.2	0.1	0	0	0	0	0	0	0
1982	M	0	0	0	0	0	0	0	0	0	0
	F	0.2	0.1	0	0	0	0	0	0	0	0
Total		**104.2**	**126.4**	**85.5**	**171.8**	**101.5**	**85.5**	**179.9**	**203.4**	**162.6**	**162.9**

Table 24. Age composition and mean total length (mm) at age of a subsample of striped bass collected from the Roanoke River by electrofishing, 2009. Standard deviations are listed in parentheses.

Year Class	Age	N Aged	N Estimated	N Total	% Composition	Total Length (mm) Mean	Min.	Max.
MALES								
2008	1	26	15	41	0.86	306 (23.58)	259	341
2007	2	47	580	627	13.17	377 (27.20)	326	420
2006	3	34	2271	2305	48.41	445 (23.46)	395	487
2005	4	23	493	516	10.84	492 (16.54)	461	534
2004	5	23	162	185	3.89	531 (18.35)	472	560
2003	6	22	48	70	1.47	570 (21.19)	521	620
2002	7	15	15	30	0.63	598 (15.71)	575	625
2001	8	8	4	12	0.25	646 (24.63)	608	685
2000	9	4	2	6	0.13	727 (16.15)	708	746
1999	10	5	1	6	0.13	815 (29.17)	779	855
1998	11	2	0	2	0.04	839 (16.26)	827	850
1997	12	2	0	2	0.04	960 (16.26)	948	971
FEMALES								
2008	1	3	2	5	0.10	240 (11.24)	230	252
2007	2	18	38	56	1.18	405 (27.12)	354	445
2006	3	37	365	402	8.44	461 (19.45)	415	496
2005	4	27	199	226	4.75	509 (17.12)	470	542
2004	5	23	59	82	1.72	555 (16.48)	526	580
2003	6	20	21	41	0.86	586 (18.33)	549	618
2002	7	16	7	23	0.48	623 (22.24)	595	691
2001	8	7	6	13	0.27	669 (29.00)	629	696
2000	9	14	5	19	0.40	790 (47.45)	716	868
1999	10	12	4	16	0.34	866 (58.03)	719	919
1998	11	21	10	31	0.65	936 (27.55)	886	981
1997	12	5	2	7	0.15	996 (14.55)	978	1011
1996	13	8	4	12	0.25	1037 (22.22)	1010	1073
1995	14	10	5	15	0.31	1051 (28.40)	995	1080
1994	15	4	1	5	0.11	1098 (25.59)	1060	1115
1993	16	5	1	6	0.13	1162 (15.93)	1146	1185
TOTALS								
Males		**211**	**3591**	**3802**	**79.86**			
Females		**230**	**729**	**959**	**20.14**			
Overall		**441**	**4320**	**4761**	**100.00**			

Table 25. Mean total length (mm) at age for Roanoke River striped bass year classes examined since 1991. Only those year classes with four or more individuals aged are included in the analysis.

Sex and Year Class	Age 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Males															
1988			465	510	545	573	581								
1989		384	445	495	523	553	586	623							
1990		383	452	494	525	560	597	647							
1991		397	450	483	539	569	613	646							
1992		397	450	474	543	579	610	682	755	805	901				
1993		373	428	511	535	573	617	661	737	800					
1994		311	462	488	537	569	608	647	740	806	867				
1995		383	435	496	534	564	616	656	758	833	845				
1996		382	441	495	530	563	611	649	711	808	826	927			
1997		369	450	489	527	569	596	644	744	799	839				
1998		387	438	486	531	553	601	670	746	807					
1999	316	389	450	490	524	565	618	666	760	815					
2000		352	439	491	529	567	616	640	727						
2001	291	369	441	489	536	573	609	646							
2002	304	379	445	491	523	569	598								
2003		386	438	485	525	570									
2004		352	428	479	531										
2005	286	365	436	492											
2006	278	362	445												
2007	307	377													
2008	306														
Females															
1988			493	524	578	592	621		749						
1989		399	473	518	549	580	626	665					1033		
1990		414	472	513	545	596	626	671	773						
1991		376	478	503	553	597	631	693		856	936	975	1005		
1992		447	466	511	572	595	638	729	778	883	933	979			
1993		375	441	536	551	602	664	705	789	883	938	990	1059	1024	1112
1994			469	507	563	616	636	696	798	882	937	1012	1039	1043	1098
1995		381	462	513	573	584	629	697	798	890	950	995	1040	1051	
1996		423	476	531	541	586	644	704	780	875	945	979	1037		
1997		429	472	512	546	583	636	685	785	870	927	996			
1998		439	462	511	546	583	635	700	776	876	936				
1999			474	511	550	595	640	697	794	866					
2000		370	466	515	552	590	639	694	790						
2001			464	514	557	595	636	669							
2002			466	515	549	580	623								
2003			472	507	552	586									
2004		351	453	515	555										
2005		403	457	509											
2006		384	461												
2007	314	405													

Table 26. Mean weight (kg) at age of a subsample of striped bass collected from the Roanoke River by electrofishing, 2009. Standard deviations are listed in parentheses.

Year Class	Age	N Aged	Weight (kg) Mean	Minimum	Maximum
MALES					
2008	1	26	0.3 (0.19)	0.1	1.1
2007	2	47	0.6 (0.16)	0.1	0.8
2006	3	34	0.9 (0.24)	0.2	1.4
2005	4	22	1.3 (0.18)	0.9	1.6
2004	5	23	1.7 (0.23)	1.2	2.2
2003	6	22	2.0 (0.33)	1.5	2.9
2002	7	15	2.4 (0.46)	1.7	3.6
2001	8	8	3.0 (0.36)	2.4	3.5
2000	9	4	4.5 (0.90)	3.8	5.7
1999	10	5	7.1 (0.61)	6.2	7.8
1998	11	2	6.5 (0.99)	5.8	7.2
1997	12	2	8.8 (0.42)	8.5	9.1
FEMALES					
2008	1	3	0.1 (0.00)	0.1	0.1
2007	2	7	0.8 (0.13)	0.7	1.0
2006	3	37	1.1 (0.19)	0.7	1.4
2005	4	27	1.4 (0.23)	0.9	1.8
2004	5	23	1.8 (0.21)	1.4	2.2
2003	6	15	2.3 (0.37)	1.6	2.8
2002	7	10	2.8 (0.53)	2.1	4.1
2001	8	1	3.5	3.5	3.5
2000	9	10	5.7 (1.2)	4.0	7.5
1999	10	10	8.2 (1.0)	6.8	10.0
1998	11	18	9.7 (1.8)	7.2	13.3
1997	12	5	12.9 (0.5)	12.0	13.1
1996	13	8	14.0 (2.3)	11.0	17.5
1995	14	10	14.5 (2.5)	10.2	17.2
1994	15	5	18.6 (1.9)	15.5	20.0
1993	16	5	19.6 (1.9)	16.9	22.0

Table 27. Year class composition and mean length at age for a subsample of striped bass collected offshore North Carolina during the Cooperative Tagging Survey, 2009. Standard deviations listed in parenthesis.

			Total Length (mm)		
Year Class	N Aged	% Comp	Mean	Min	Max
2004	3	2.11	592 (35)	568	633
2003	17	11.97	682 (36)	602	735
2002	26	18.31	741 (43)	656	859
2001	37	26.06	799 (45)	673	912
2000	29	20.42	850 (49)	745	925
1999	18	12.68	916 (63)	826	1007
1998	5	3.52	953 (69)	885	1062
1997	3	2.11	944 (51)	905	1002
1996	1	0.70	1051		
1995	2	1.41	1,116 (47)	1083	1149
1994	1	0.70	1,110		
Totals	142	100.00			

Note. Table may not add due to rounding.

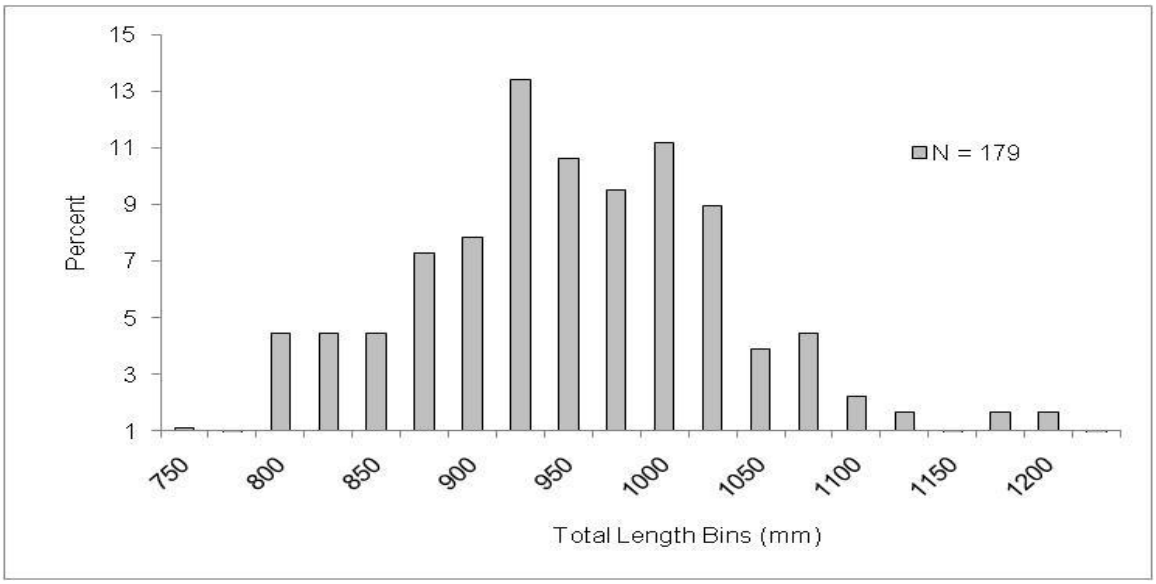

Figure 1. Length frequencies of striped bass sampled from the Atlantic Ocean commercial harvest, NC, 2008/2009 quota year.

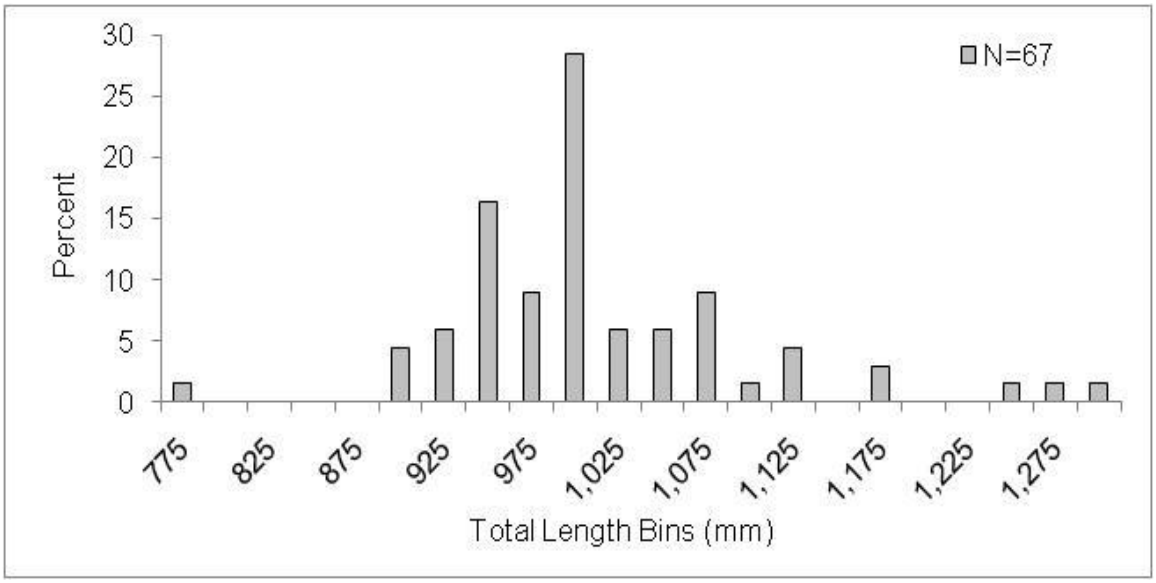

Figure 2. Length frequencies of striped bass sampled from the Atlantic Ocean recreational harvest, NC, 2009.

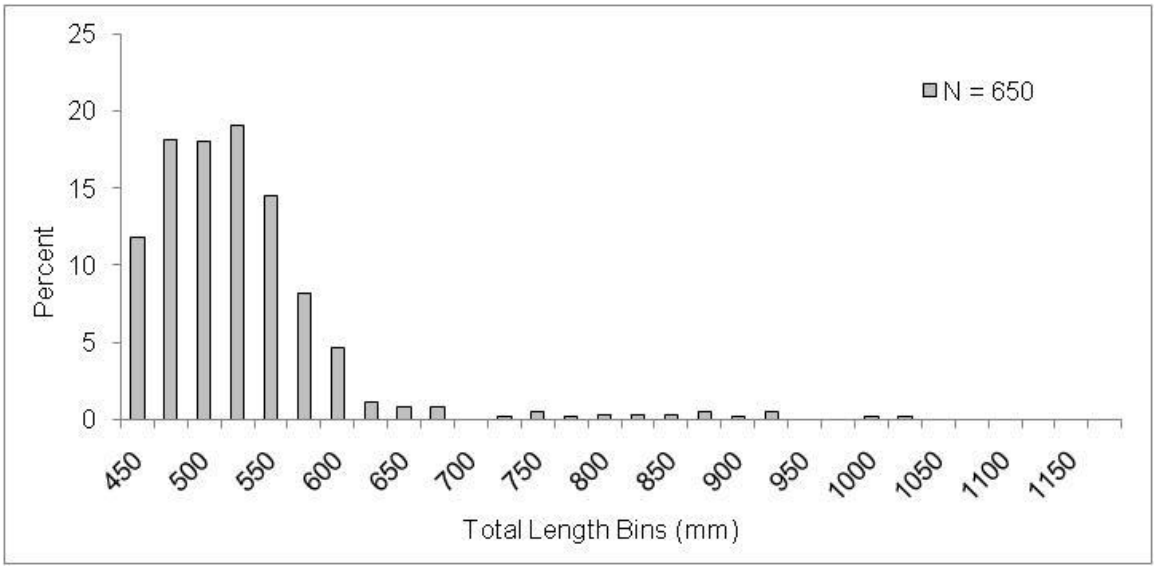

Figure 3. Length frequencies for striped bass sampled from the Albemarle Sound Management Area spring commercial harvest, NC, 2009.

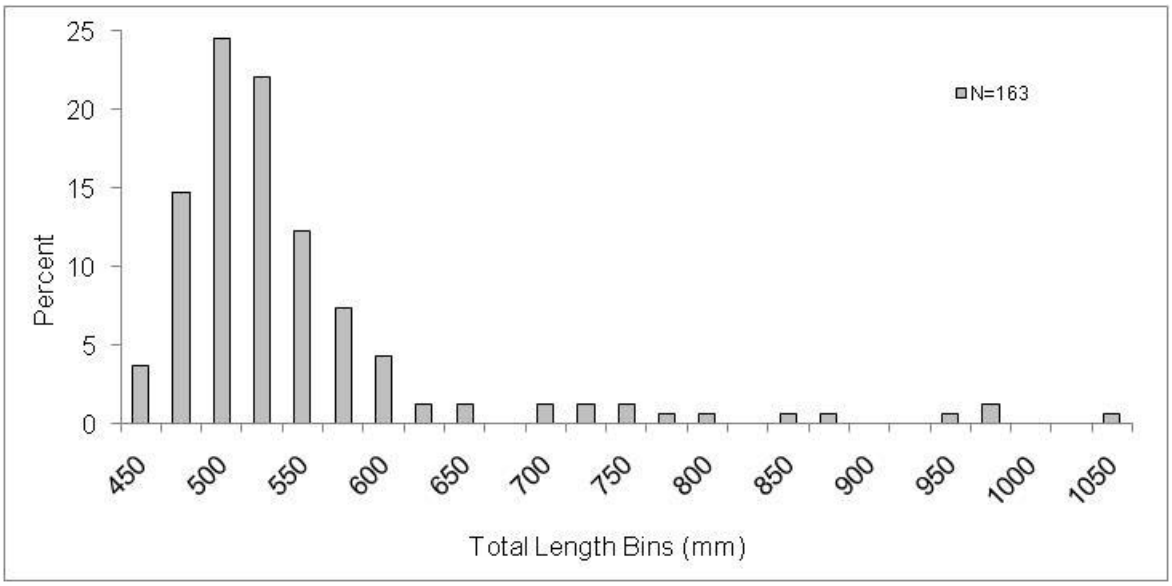

Figure 4. Length frequencies for striped bass sampled from the Albemarle Sound Management Area fall commercial harvest, NC, 2009.

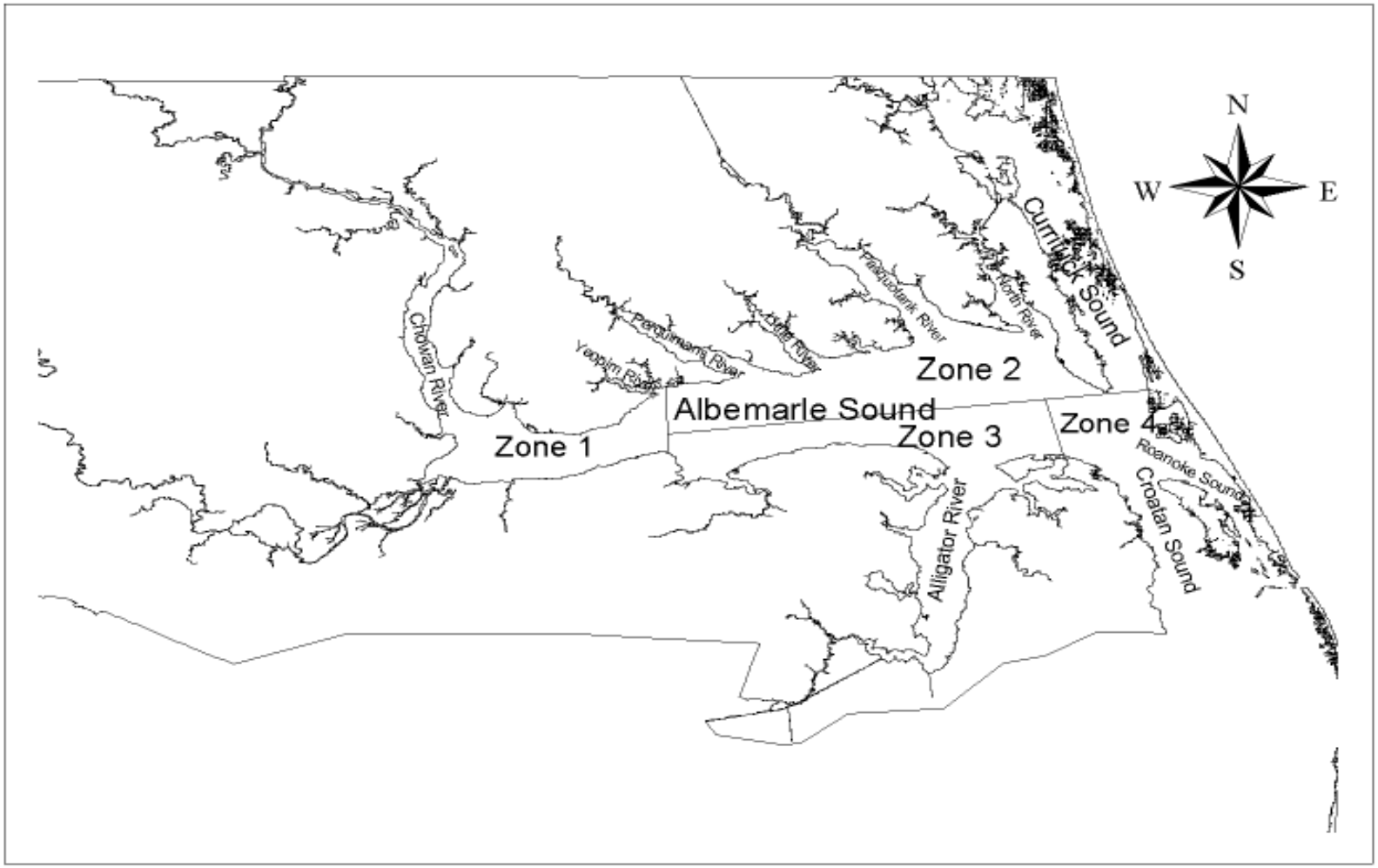

Figure 5. Zones sampled by the striped bass creel survey during the recreational seasons in the Albemarle Sound Management Area, NC, 2009.

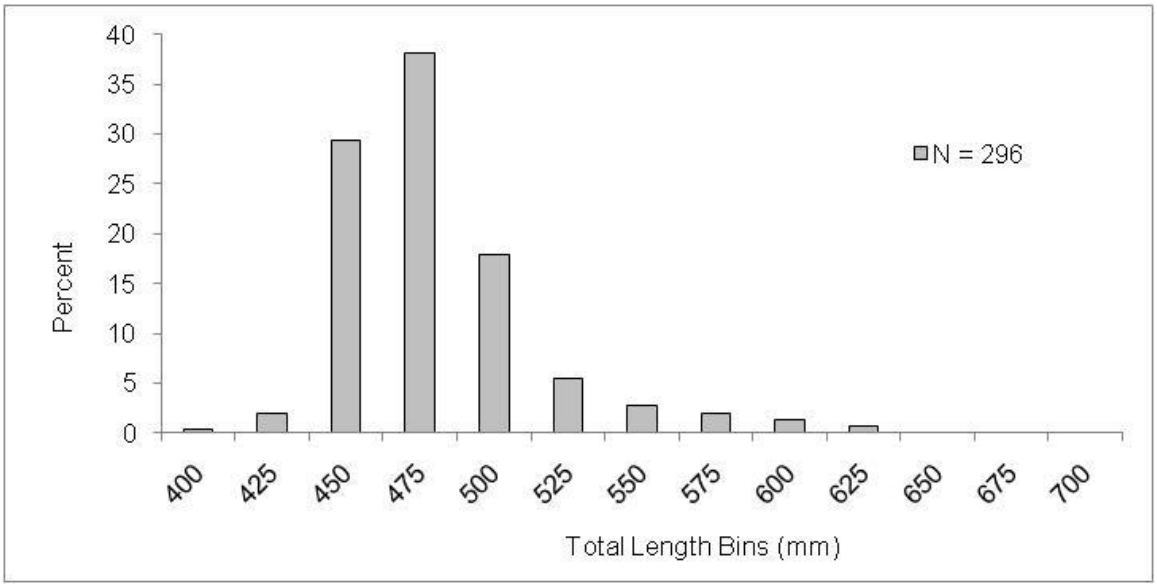

Figure 6. Length frequencies for striped bass sampled from the Albemarle Sound Management Area spring recreational harvest, NC, 2009.

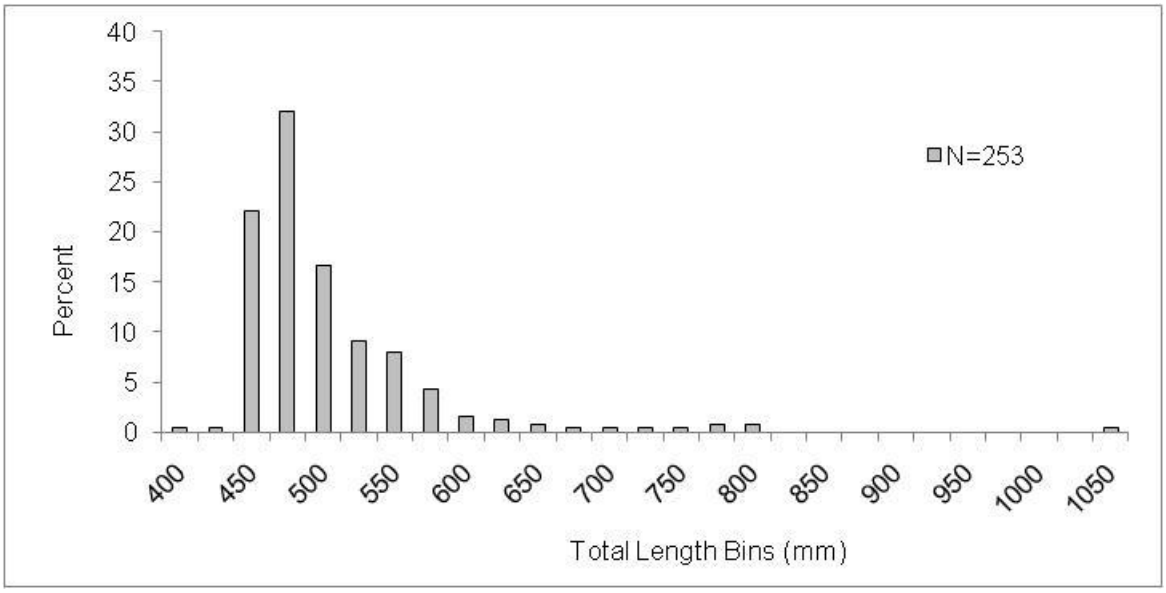

Figure 7. Length frequencies for striped bass sampled from the Albemarle Sound Management Area fall recreational harvest, NC, 2009.

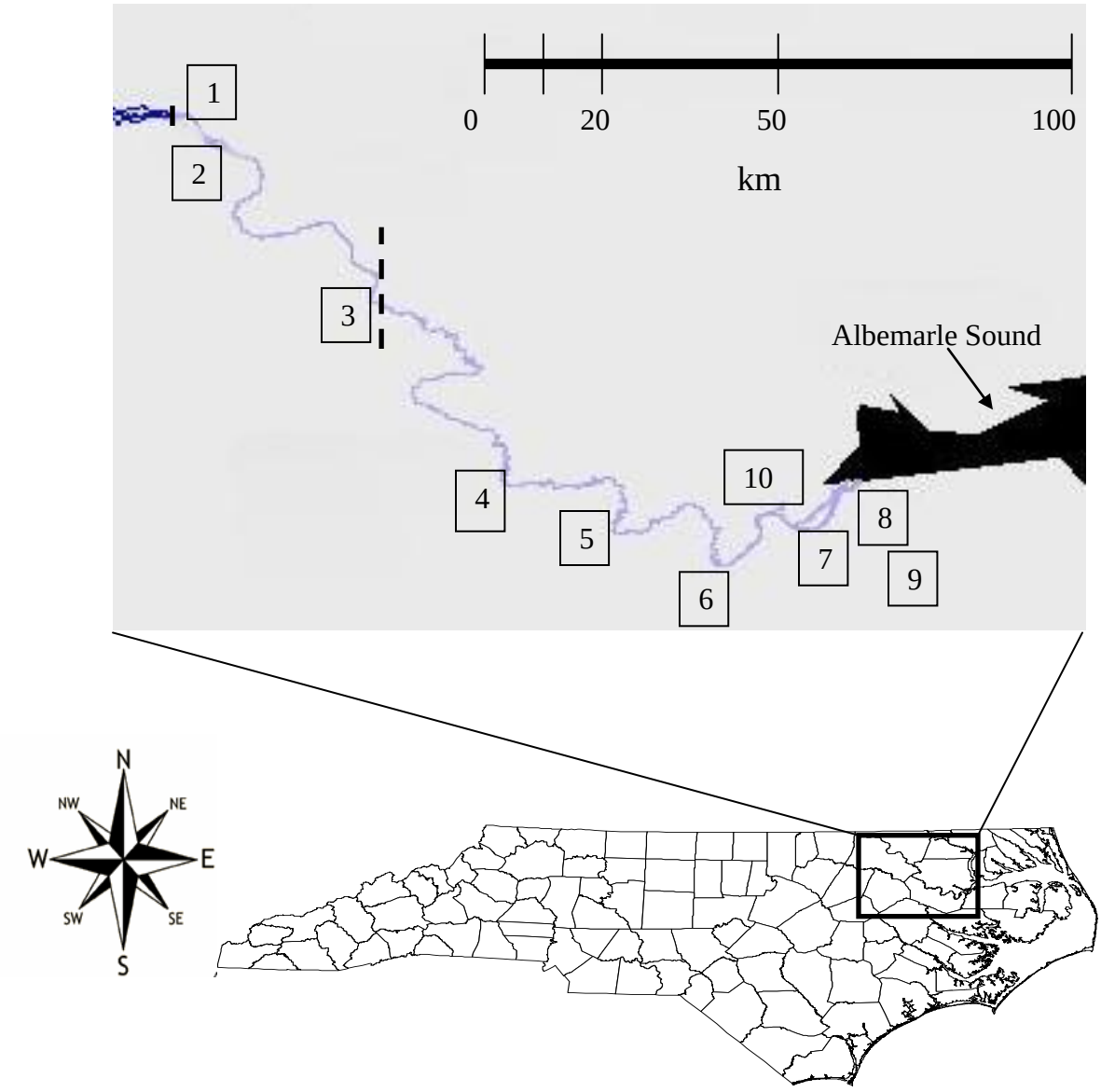

Figure 8. Map of angler creel survey interview locations on the Roanoke River during spring 2008. The dashed line indicates the demarcation point between the upper and lower zones. Zone 1 access areas as numbered in the boxes include: 1) Gaston (US HWY 48); 2) Weldon; and 3) Scotland Neck (Edwards Ferry US HWY 258). Zone 2 access areas include: 4) Hamilton; 5) Williamston; 6) Jamesville; 7) Plymouth; 8) US HWY 45; 9) Conaby Creek; and 10) Sans Souci (Cashie River).

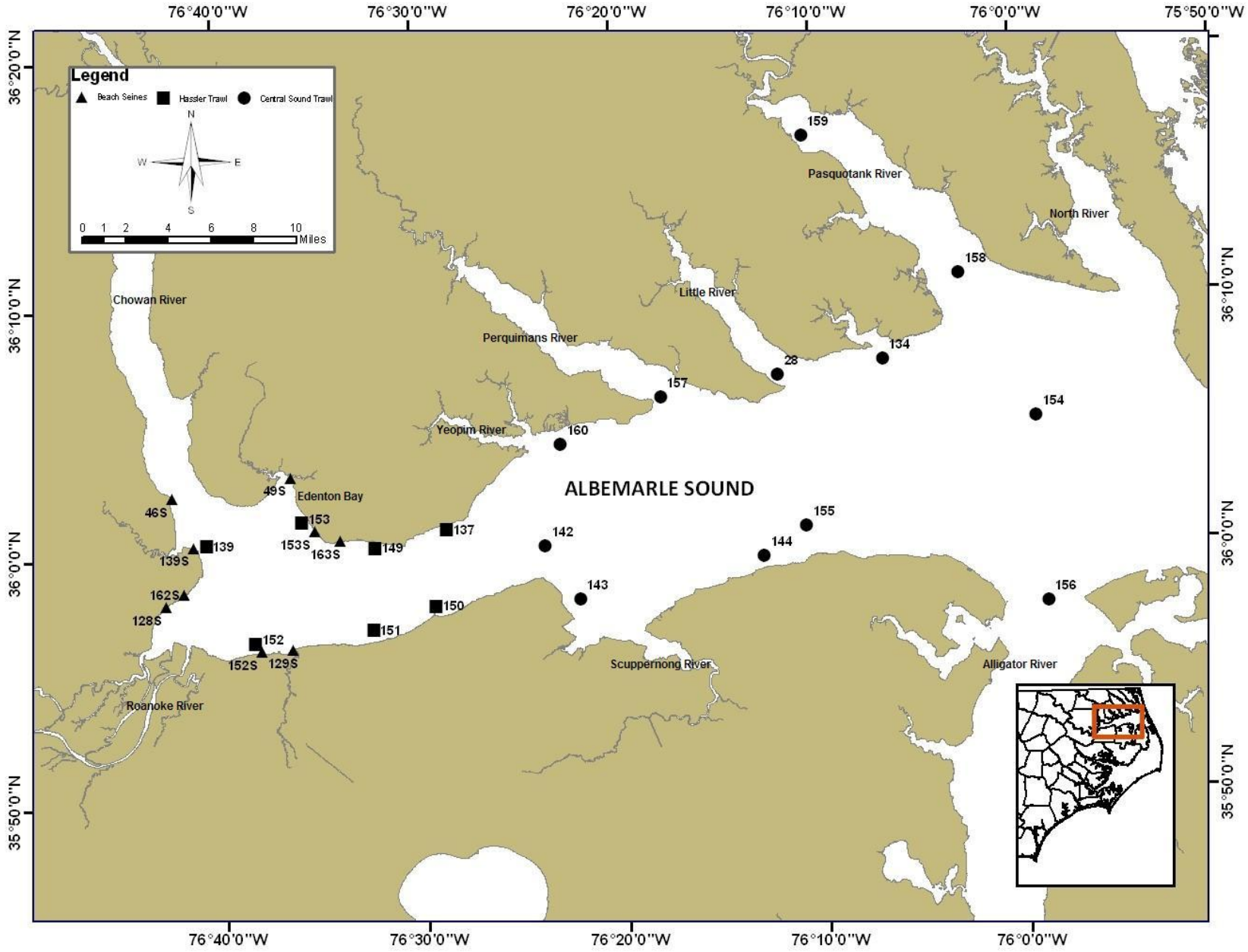

Figure 9. Location of juvenile striped bass beach seine and trawl sites, Albemarle Sound NC, 2009

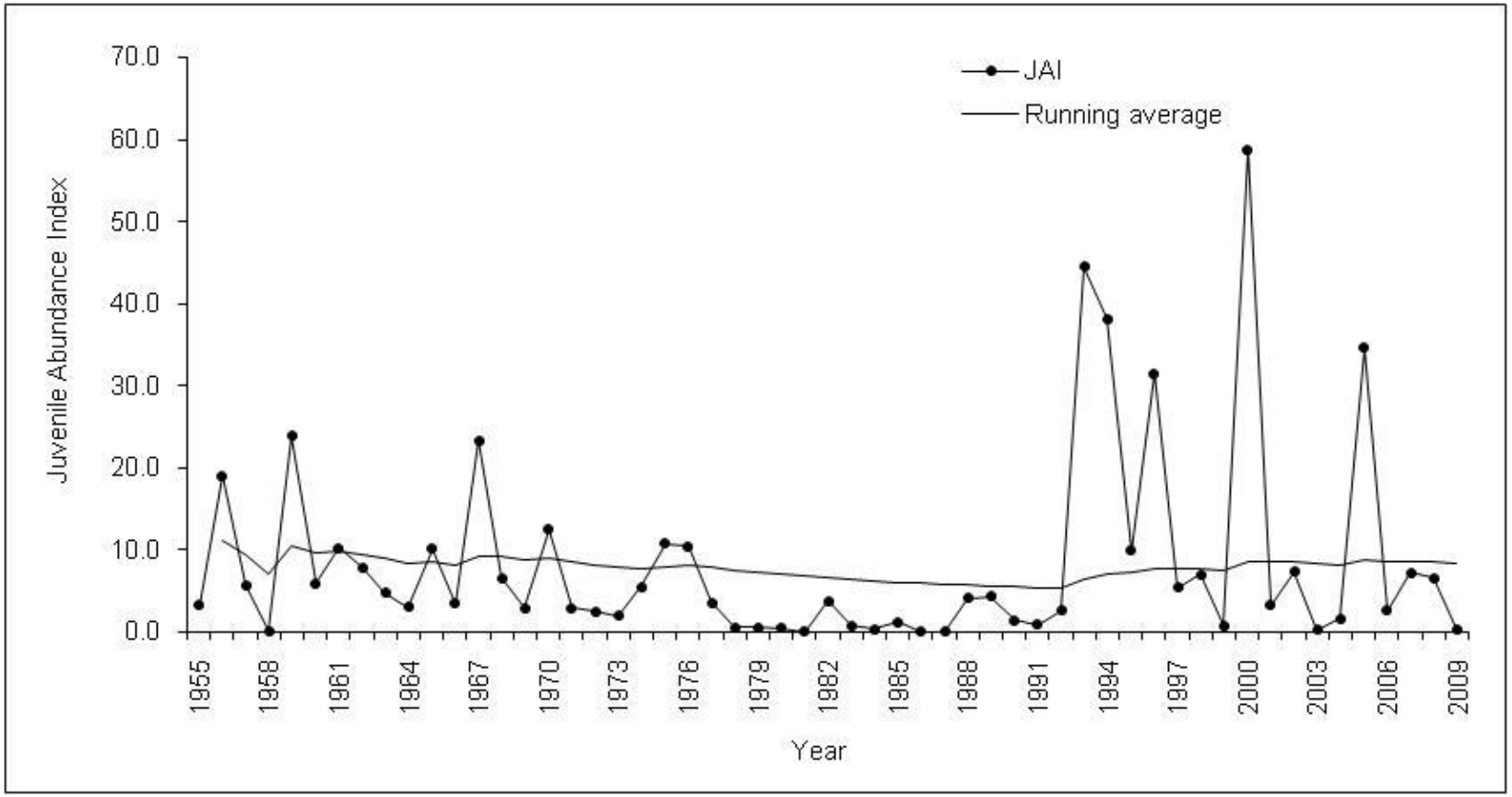

Figure 10. Juvenile Abundance Index (JAI) for striped bass young-of-year trawl sampling in western Albemarle Sound NC 1955 – 2009.

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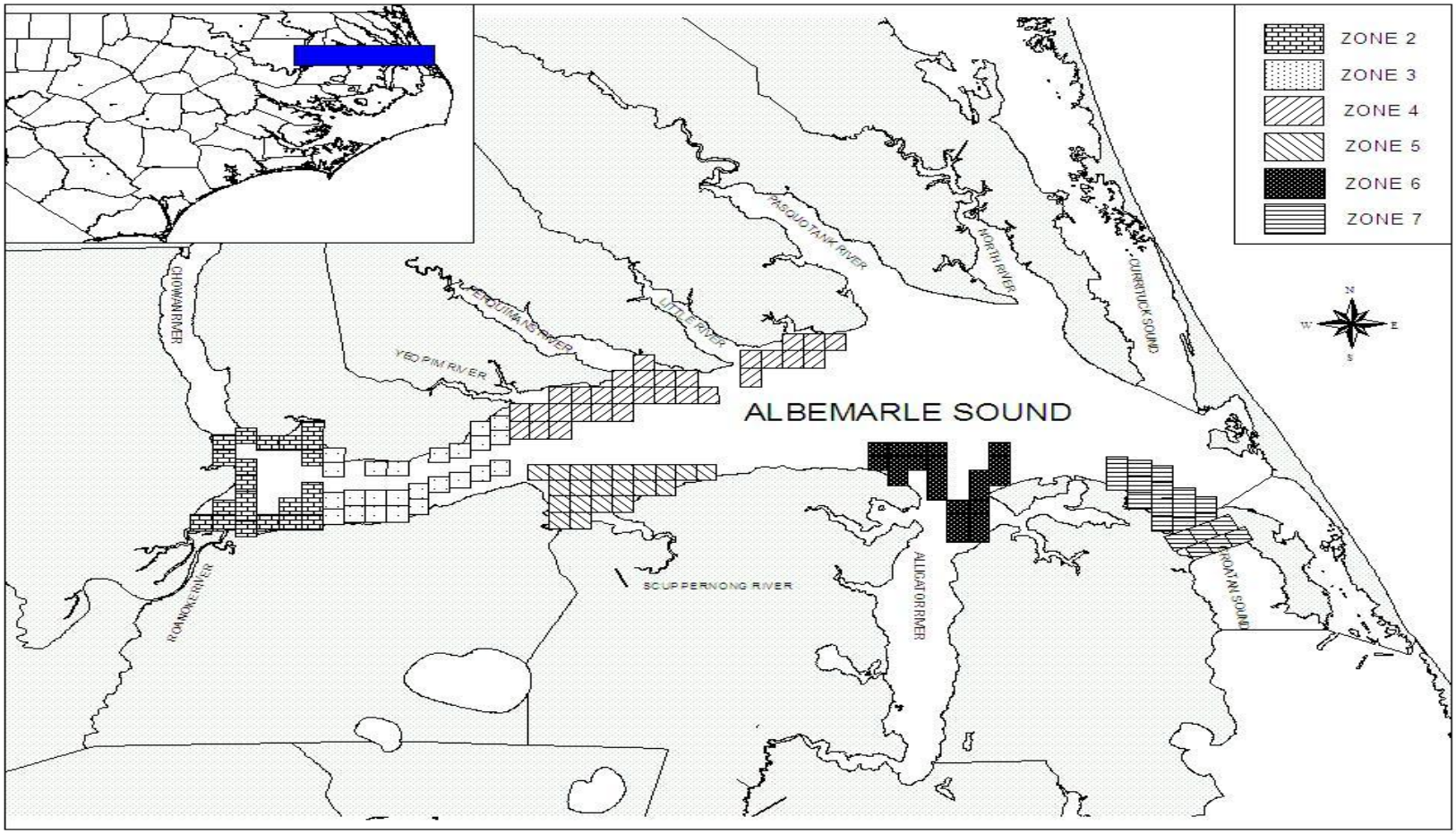


Figure 11. Sample zones for the fall/winter DMF Independent Gill Net Survey, Albemarle and Croatan Sounds, NC 2008/2009.

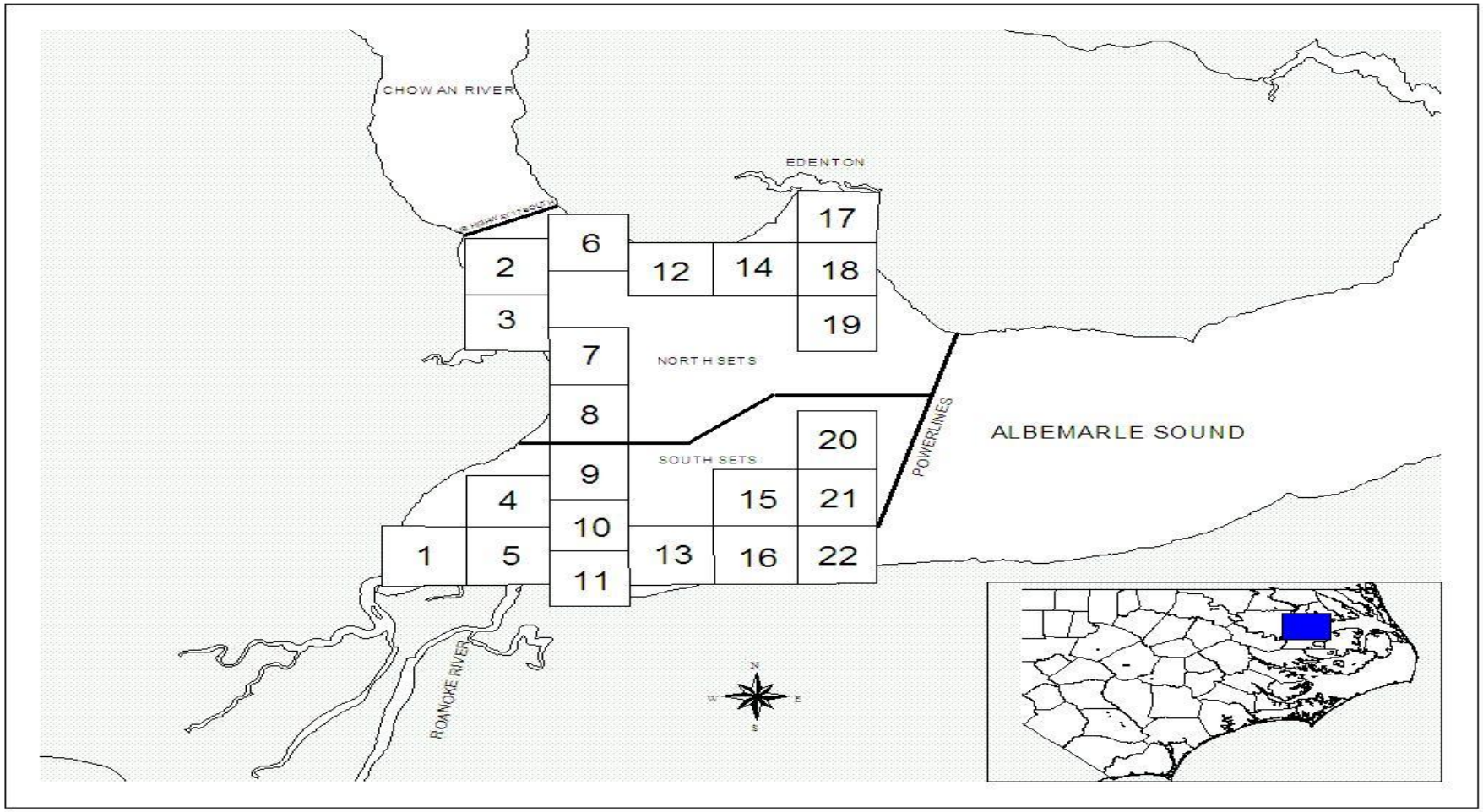
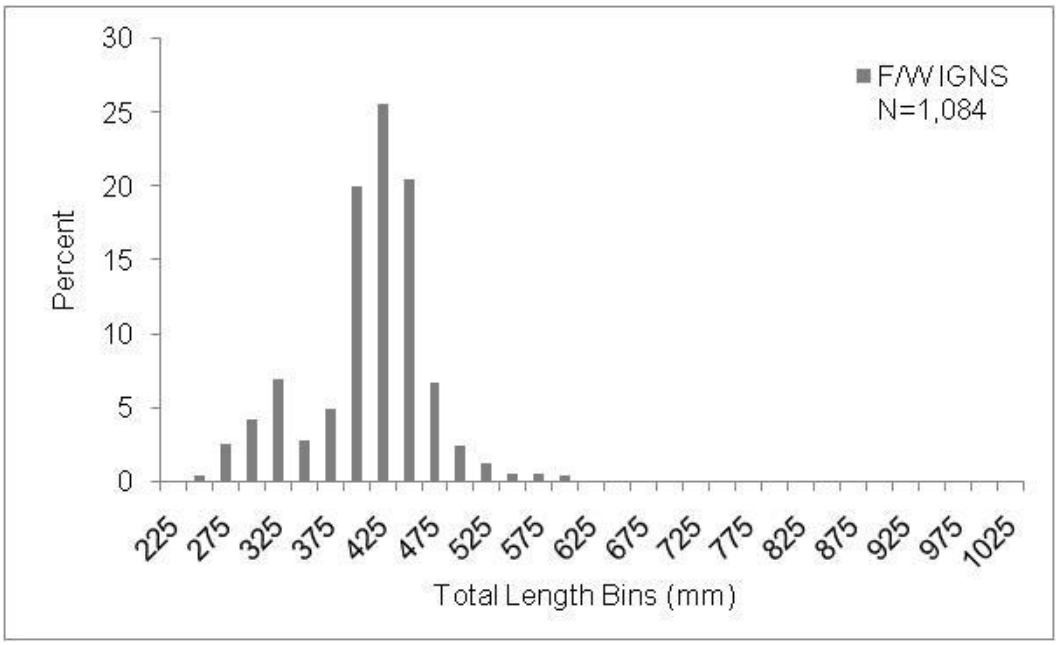


Figure 12. Sample Zone II and the north/south quadrants for the spring DMF Independent Gill Net Survey, western Albemarle Sound, NC 2009.

a.



b.

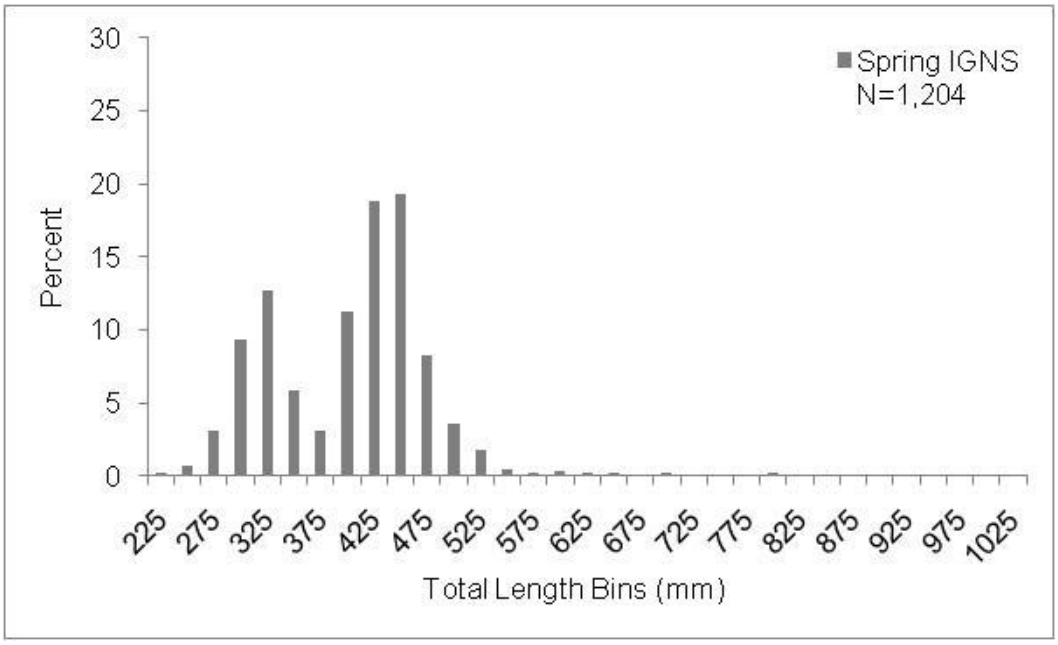


Figure 13. Length frequencies of striped bass sampled in the 2008/20009 fall/winter (a) and spring (b) Independent gill net surveys, Albemarle Sound, NC.

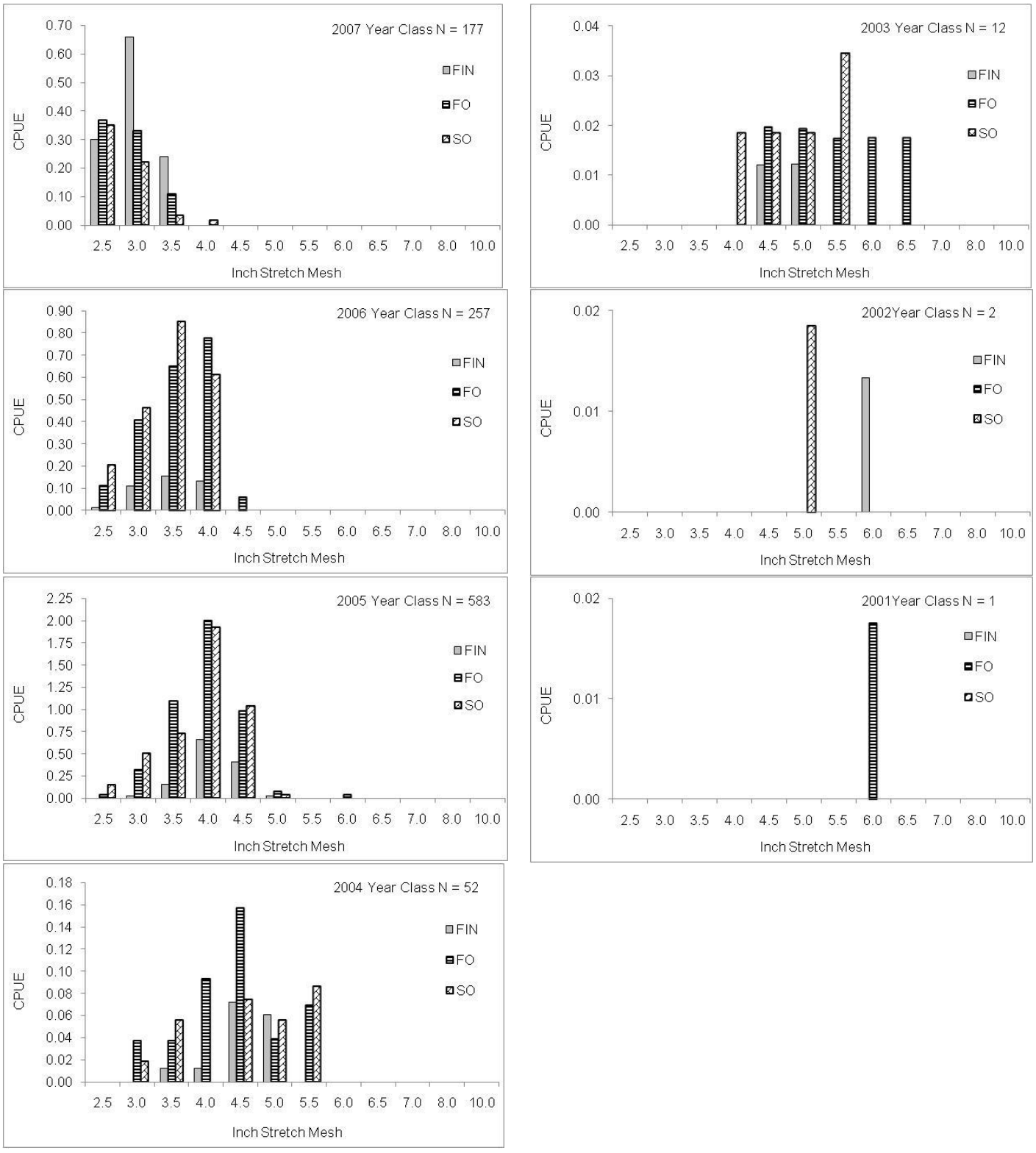


Figure 14. CPUE by year class, mesh size, and gear type of striped bass collected in the NCDMF fall/winter Independent Gill Net Survey, Albemarle and Croatan Sounds, NC 2008/2009. FIN = float inshore & sink inshore, FO = float offshore, and SO = sink offshore net. Note scale changes in y-axes.

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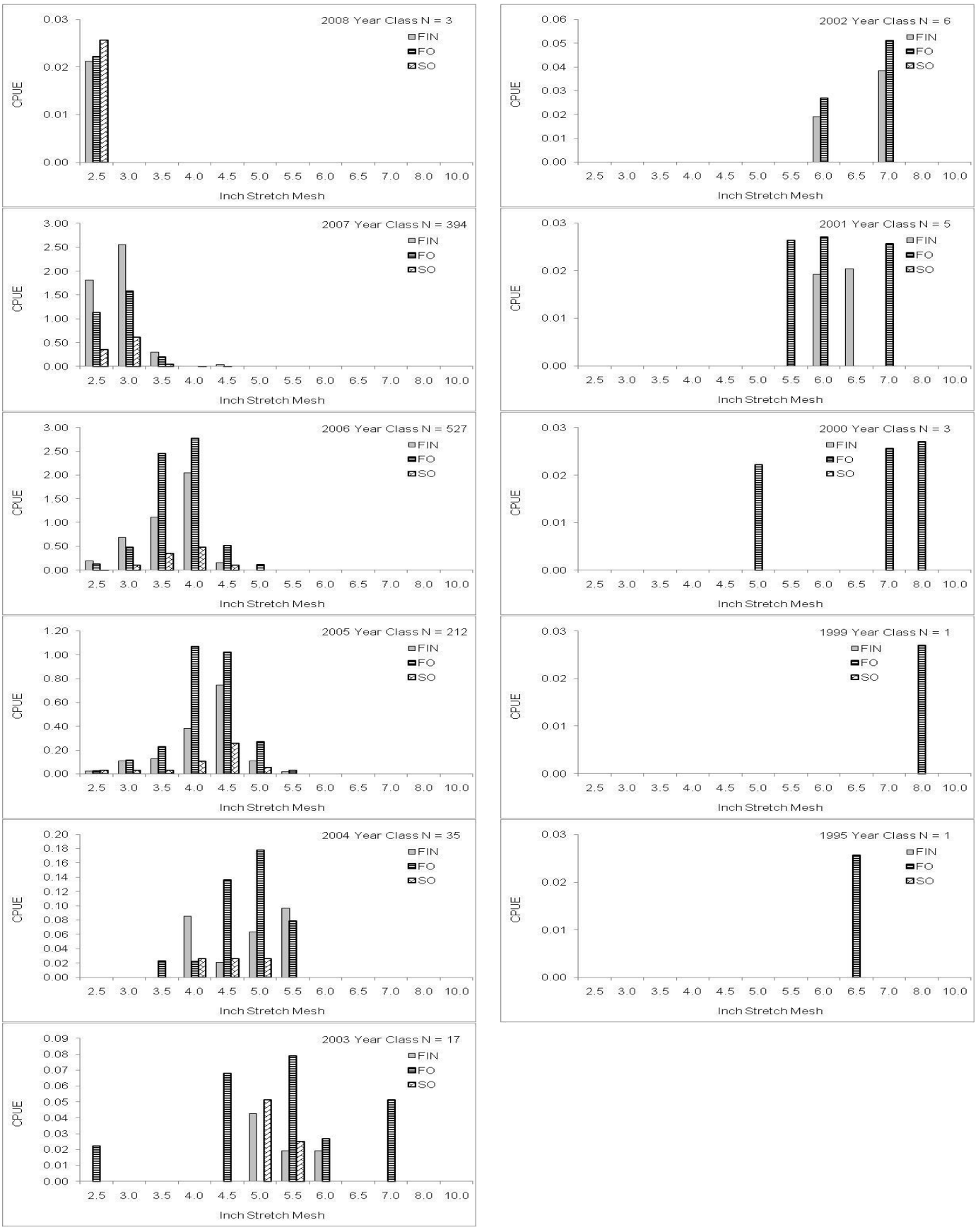

Figure 15. CPUE by year class, mesh size, and gear type of striped bass collected in the NCDMF spring Independent Gill Net Survey, western Albemarle Sound, NC 2009. FIN = float inshore & sink inshore, FO = float offshore, and SO = sink offshore net. Note scale changes in y-axes

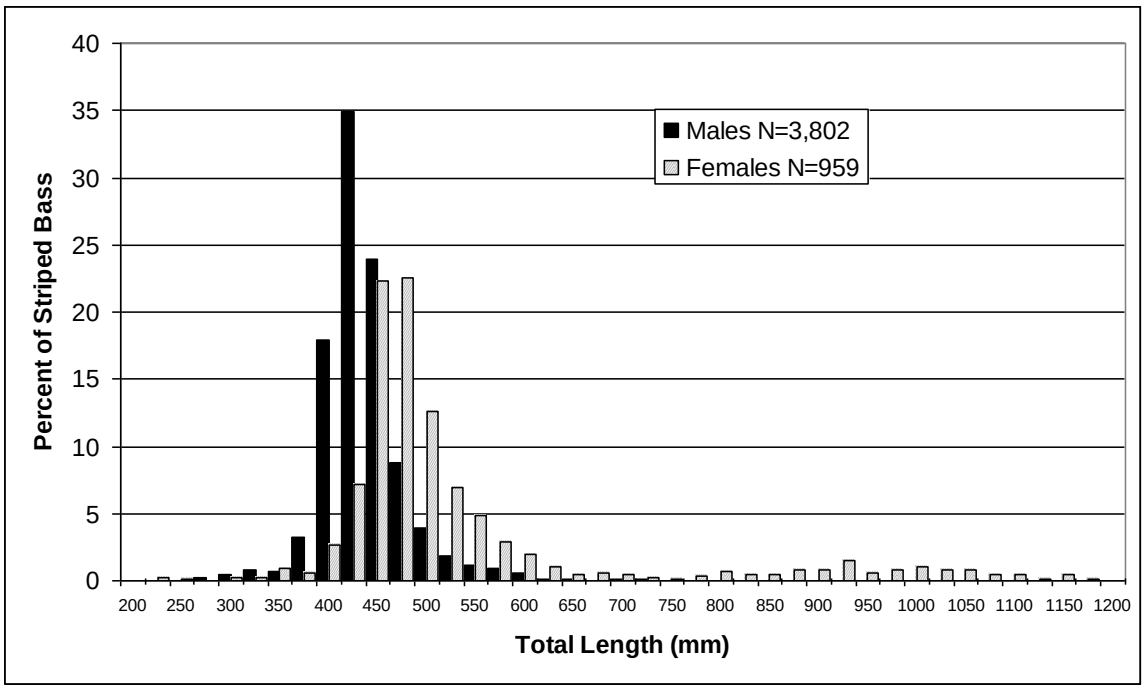

Figure 16. Length frequencies for striped bass collected from the Roanoke River, spring 2009. Male and female plots each sum separately to 100.

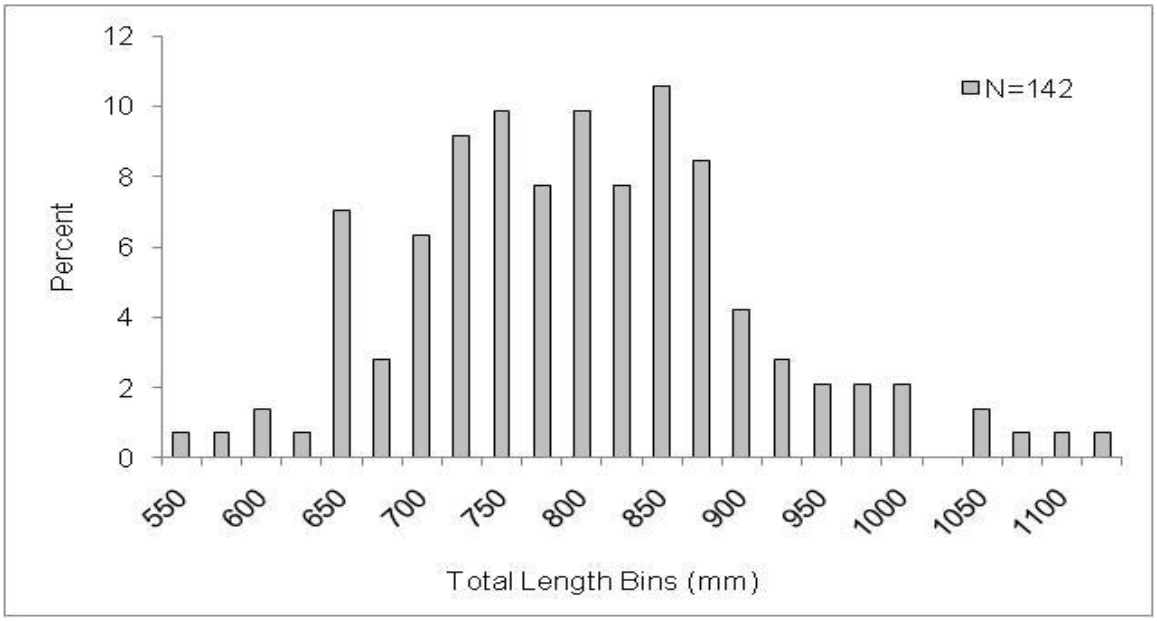

Figure 17. Length frequencies for a subsample of striped bass collected offshore North Carolina and Virginia during the Cooperative Tagging Cruise, 2009.

APPENDIX A. TOTAL STRIPED BASS LOSSES FOR THE 2009 CALENDAR YEAR, NC.

Fishery	Area	N	LBS
Commercial			
	ASMA		
	spring	15,904	60,098
	fall	8,097	36,036
	bycatch mortality	30,043	32,495
	Atlantic Ocean		
	2009 cal year	9,032	189,995
	bycatch mortality	no	estimate
Recreational			
	ASMA		
	spring	8,164	22,904
	fall	3,905	14,409
	discard mortality	2,596	5,452
	RRMA		
	spring	23,248	69,581
	discard mortality	10,386	32,093
	Atlantic Ocean		
	2009 cal year	8,097	211,726
	discard mortality	6,022	157,475
Research			
	ASMA		
	F/W IGNS	483	729
	Spring IGNS	894	1,767
	RRMA	116	571
Aquaculture			
	ASMA	0	0
	RRMA	0	0
Broodstock	ASMA	0	0
	RRMA	81	492
RCGL			
	ASMA		
		no	estimate
TOTALS		**127,068**	**835,823**

APPENDIX B. NORTH CAROLINA STRIPED BASS TAGGING AND RETURN SUMMARY. JANUARY 1980 – DECEMBER 2009.

North Carolina Striped Bass Tagging and Return Summary

January 1980 – December 2009

Sara E. Winslow
North Carolina Division of Marine Fisheries

February 2010

Summary of North Carolina
Striped Bass Tagging Programs
January 1980 – December 2009

The Division of Marine Fisheries has conducted numerous striped bass tagging programs in North Carolina since 1980. These tagging efforts have been funded by several different federal aid projects. The following will summarize tagging efforts and returns from January 1980 through December 2009.

Phase II Striped Bass Stocking and Tagging

The North Carolina Phase II striped bass stocking and tagging program began in 1980, as a co-operative agreement with the US Fish and Wildlife Service (USFWS). Phase II fish were supplied by the Edenton and McKinney Lake National Fish Hatcheries, NC, as well as hatcheries in South Carolina, Georgia, Alabama and Texas. Edenton Hatchery has been the primary producer. Phase II fish ranged in size from approximately 4 – 10 inches (102 – 254 mm) TL at release. Phase II fish were released in the Cape Fear, Neuse, and Tar-Pamlico rivers on a rotating basis (Figure 1). The Albemarle Sound area was stocked in 1981 and annually during 1983 – 1996 (Figure 1). All of the stockings have occurred in the natural striped bass nursery areas (Street et al. 1975, Marshall 1976, Sholar 1977, and Hawkins 1979). Table 1 shows release dates,

locations, year class of stocked fish, number released, number tagged, number returned and percent returned to date.

Three types of tags have been utilized since the program began. The Carlin disc was used from January 1980 through January 1983. From December 1983 through December 1992, Phase II fish were tagged with cinch-up tags, except in the Albemarle Sound area stockings. The internal anchor tag was first employed in 1990 on Albemarle Sound area Phase II fish and other area stockings during 1993. The use of the Carlin disc and cinch-up tags were discontinued due to these tag types becoming easily entangled in gill nets prior to the fish recruiting into the fisheries. These early returns however, provided valuable data on pre-recruit movements. Recaptures prior to legal recruitment into the fisheries have essentially been eliminated since internal anchor tags have been in use, these tags will not entangle in gill nets.

Cape Fear River Stocking Summary

Phase II striped bass were stocked in the Cape Fear River at Wilmington during 1980, 1984, 1989, 2004, 2006 and 2008 (Figure 1). A total of 515,471 striped bass was stocked, of which 14,095 were tagged. Only 66 tags have been returned (Table 1). The majority of these returns were prior to the fish obtaining legal size. Since 1991, no tags have been returned from the 1980 – 1989 stockings. Gill nets and hook-and-line were the dominant recapture gears. Eleven tags have been returned from the 2006 stocking and four from the 2008 stocking.

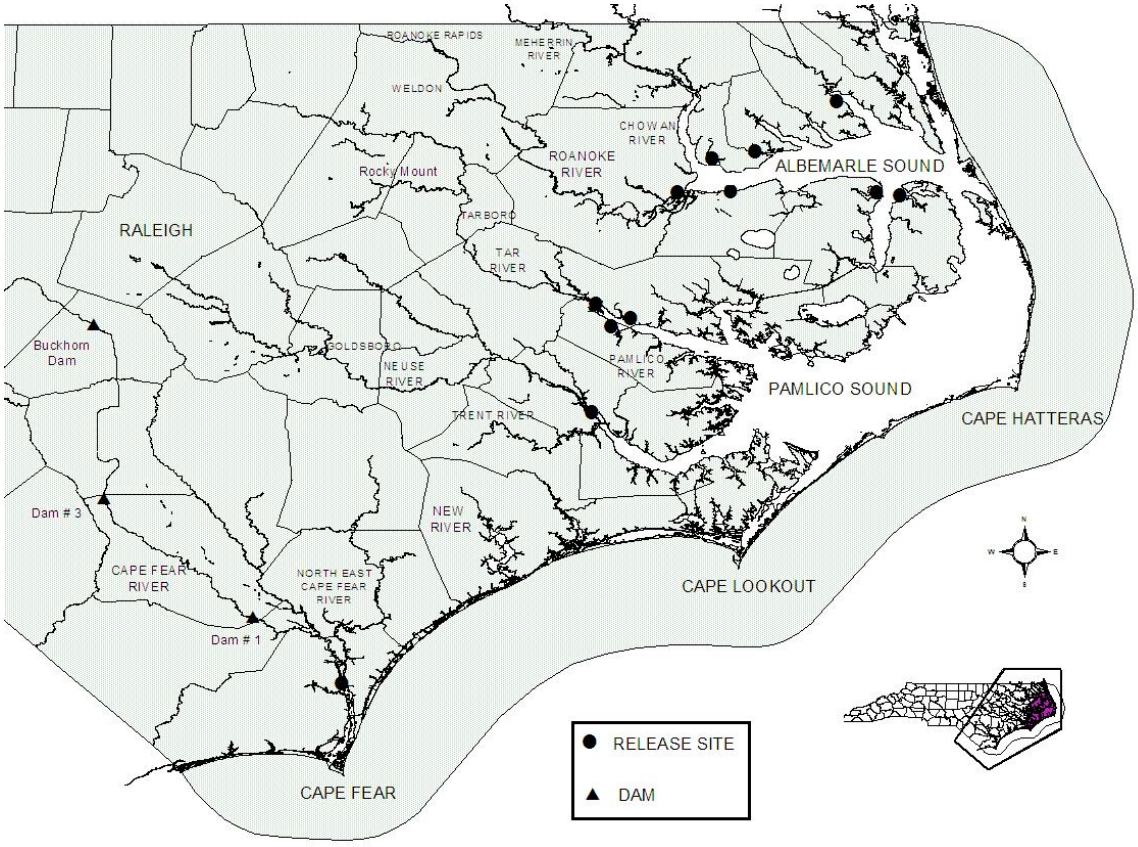

Figure 1. Release sites of Phase II striped bass stockings, 1980 – 2008.

For the period 1990 – 2003, Phase II stockings did not occur in the Cape Fear River due to a high presence of hybrids. The 2004 NC Estuarine Striped Bass Fishery Management Plan recommended that Phase II stocking resume in the Cape Fear system and thus was reinstated in 2004 on a rotating basis.

The North Carolina Marine Fisheries Commission and the North Carolina Wildlife Resources Commission have enacted a moratorium on the commercial and recreational harvest of striped bass in their respective jurisdictions in the Cape Fear River system. This action was taken as part of the management measures recommended in the NC Estuarine Striped Bass Fishery Management Plan (2004) due to the poor status of the population.

Albemarle Sound Area Summary 1981 – 1996

From 1981 – 1996, a total of 701,908 Phase II striped bass have been stocked in the Albemarle Sound area, of which 53,561 were tagged (Table 1). From these various stockings, 4,714 tags (8.8%) have been returned. Seventy-two tags (1.5%) have been from the spawning grounds on Roanoke River. The tag returns indicate that stocked fish do contribute to the commercial and recreational harvest and to some extent augment the spawning population. Eighteen (0.4%) tag returns were from outside North Carolina waters, indicating very little contribution to the Atlantic migratory stock (Table 2). No recaptures have been reported since 2006.

Neuse River Stockings

1982 – 2000 Stocking

Phase II striped bass were stocked in the Neuse River during 1982, 1986, 1988, 1990, 1992, 1994, 1996, 1998 and 2000. Table 1 shows the number of fish released, tagged and number of returns. A total of 709,094 fish was released during this time period; of the total 24,848 fish were tagged (Table 1). The majority of the returns have been from the hook- and-line fishery. Table 2 shows the tag returns from outside the Neuse River area.

December 2002 Stocking

A total of 147,654 Phase II fish was released during November and December 2002, in the Neuse River above New Bern; 2,960 fish were tagged prior to release. A total of 18 tags have been returned, all from the hook-and-line recreational fishery (Table 1). One tagged fish was captured in Oregon Inlet on June 26, 2006 (Table 2). In November 2007, a tagged fish was recaptured at Fire Island Inlet, NY (Table 2). A tagged striped bass was recaptured in Durham Creek, a tributary to Pamlico River on November 1, 2008.

December 2004 Stocking

During the fall 2004, an estimated 168,011 Phase II striped bass were released in the Neuse River (Table 1). A total of 2,500 fish was tagged prior to release. Excessive

mortality occurred at the hatchery, resulting in another batch of fish being tagged. When the tagged fish were released they had experienced excessive stress. Two tags were returned within a couple of days of release from fish found dead in the river. Thus the number of tagged fish stocked is not known. A total of 7 tags have been returned.

December 2006 Stocking

A total of 99,595 Phase II fish was released during the fall 2006 in the Neuse River above New Bern. Three thousand fish were tagged prior to release (Table 1). Through December 2009, 52 tags have been returned, with the majority of the recaptures from the area near New Bern.

December 2007

The Neuse River, above New Bern was stocked with 69,953 Phase II striped bass during November and December 2007. Three thousand of the fish were tagged prior to release. A total of 135 tags have been returned (Table 1). The majority of the returns have been from Pitch Kettle to Slocum Creek and by hook and line. However, in October 2008 a return was reported from Pamlico River and in March 2009 a return from Chowan River off Rocky Hock Creek was submitted.

Neuse River Summary

Phase II stocking programs have accounted for 1,194,307 fish being released in the Neuse River. A total of 36,308 fish was tagged and 985 (2.7%) have been returned. These fish have contributed to the commercial and recreational harvest and contributed to the spawning stock to some extent. Table 2 shows the returns from other North Carolina systems and from outside the waters of the state. Only three tags have been returned from outside the waters of North Carolina (NY and MD). For the entire period, 19 returns occurred from other internal waters, with 12 of these returns from the Albemarle Sound Management Area (ASMA).

Pamlico River Stockings

1983 – 1999 Stocking

The Pamlico River area was stocked with Phase II striped bass during 1983, 1984, 1987, 1991, 1993, 1994, 1996, 1997, and 1999 (Table 1). Through these stockings 636,279 fish have been released; of which 22,629 fish were tagged prior to release. The numbers of returns are shown in Table 1 and no returns have occurred in 2008.

December 2001

During November and December 2001, a total of 37,000 Phase II fish was released in Upper Goose Creek, a tributary to Pamlico River. Of the total 3,000 tagged fish were released on December 14, 2001 (Table 1). To date, 32 tags have been returned, all from the Tar-Pamlico area, except for three (Neuse River-New Bern, Coinjock Canal, and Currituck Sound bridge (Table 2)). Hook-and-line has accounted for 74.2% of the returns and gill nets 25.8%. No returns occurred in 2007/2008.

December 2003

A total of 159,996 Phase II striped bass was released in Upper Goose Creek during November and December 2003. On December 11, 2003, 3,000 tagged fish, of the

total were released (Table 1). Twenty tags have been returned, with nineteen being from the Pamlico River area and one from Albemarle Sound, near Columbia. Approximately 68% of the returns have been from hook-and-line and 26% from gill nets.

December 2005

During the fall of 2005, a total of 267,376 Phase II striped bass was released in Upper Goose Creek; of which 3,000 were tagged prior to release (Table 1). Thirty-five tags have been returned. One fish was recaptured in Chowan River (April 2007) and two in Roanoke River at Weldon (May 2007, April 2008) (Table 2). Three returns have been reported from Neuse River at New Bern (November 2007, October 2008 and January 2009) (Table 2).

December 2007

A total of 69,871 Phase II fish were released in Upper Goose Creek, of which 3,000 were tagged prior to release (Table 1). A total of 52 tags (N = 50 hook and line, N = 2 gill net) have been returned. All returns were from the Tar/Pamlico or Pungo river areas.

Table 1. Phase II striped bass stockings in coastal North Carolina, 1980 – 2008.

Release Date	Stocking location	Year Class	Total number Stocked	Number Tagged	Number Returned	Percent Returned
Jan 1980	Cape Fear River	1979	14,874	2,900	17	0.6
Jan 1984	Cape Fear River	1983	56,437	1,395	6	0.4
Dec 1989	Cape Fear River	1989	77,242	1,300	23	1.8
Dec 2004	Cape Fear River	2004	172,055	2,500*	5	0.2
Dec 2006	Cape Fear River	2006	102,283	3,000	11	0.3
Dec 2008	Cape Fear River	2008	92,580	3,000	4	0.1
Total			**515,471**	**14,095**	**66**	**0.5**
Jan 1981	Albemarle S. area	1980	87,181	10,000	1,817	18.2
Jan 1983	Albemarle S. area	1982	106,675	2,500	719	28.8
Dec 1983	Edenton Bay	1983	67,433	2,493	277	11.1
Dec 1984	Albemarle S. area	1984	236,242	6,445	575	8.9
Jan 1986	Albemarle S. area	1985	45,200	1,110	38	3.4
Dec 1986	Albemarle S. area	1986	118,345	4,999	453	9.1
Dec 1987	Pasquotank River	1987	15,435	2,500	214	8.6
Dec 1988	Cashie River	1988	5,000	5,000	94	1.9
Dec 1989	Albemarle S. area	1989	3,289	1,400	22	1.6
Dec 1990	Albemarle S. area	1990	2,000	2,000	62	3.1
Dec 1991	Albemarle S. area	1991	2,994	2,994	321	10.7
Dec 1992	Albemarle S. area	1992	2,465	2,465	84	3.3
Dec 1993	Albemarle S. area	1993	2,180	2,180	20	0.9
Dec 1994	Albemarle S. area	1994	2,481	2,481	2	0.1
Jan 1996	Alligator R	1995	2,498	2,498	14	0.5
Dec 1996	Albemarle S. area	1996	2,490	2,490	2	0.08
Total			**701,908**	**53,561**	**4,714**	**8.8**
Feb 1982	Neuse River	1981	47,648	2,100	230	11.0
Jan 1986	Neuse River	1985	39,769	2,119	60	2.8
Dec 1988	Neuse River	1988	71,092	2,500	22	0.9
Dec 1990	Neuse River	1990	61,877	2,992	84	2.8
Dec 1992	Neuse River	1992	116,820	2,527	137	5.4
Dec 1994	Neuse River	1994	79,933	2,212	7	0.3
Dec 1996	Neuse River	1996	100,760	4,998	119	2.4
Dec 1998	Neuse River	1998	83,195	2,500	75	3.0
Dec 2000	Neuse River	2000	108,000	2,900	39	1.3
Dec 2002	Neuse River	2002	147,654	2,960	18	0.6
Dec 2004	Neuse River	2004	168,011	2,500*	7	0.2
Dec 2006	Neuse River	2006	99,595	3,000	52	1.6
Dec 2007	Neuse River	2007	69,953	3,000	135	4.5
Total			**1,194,307**	**36,308**	**985**	**2.7**
Jan 1983	Pamlico River area	1982	76,674	2,500	500	20.0
Dec 1984	Pamlico River area	1984	26,000	1,000	28	2.8
Dec 1987	Pamlico River area	1987	17,993	2,500	39	1.6
Dec 1991	Pamlico River area	1991	30,801	1,993	78	3.9
Dec 1993	Pamlico River area	1993	118,600	2,204	39	1.8
Dec 1994	Pamlico River area	1994	183,254	2,320	24	1.0
Jan 1996	Pamlico River area	1995	140,972	2,497	49	2.0
Dec 1997	Pamlico River area	1997	24,031	4,865	102	2.1

Table 1	Continued.					
Release Date	**Stocking location**	**Year Class**	**Total number Stocked**	**Number Tagged**	**Number Returned**	**Percent Returned**
Dec 1999	Pamlico River area	1999	17,954	2,750	122	4.4
Dec 2001	Pamlico River area	2001	37,000	3,000	32	1.1
Dec 2003	Pamlico River area	2003	159,996	3,000	20	0.7
Dec 2005	Pamlico River area	2005	267,376	3,000	35	1.2
Dec 2007	Pamlico River area	2007	69,871	3,000	52	1.7
Dec 2008	Pamlico River area	2008	91,962	3,000	21	0.7
Total			**1,262,484**	**37,629**	**1,141**	**3.0**

* High mortality at hatchery and in transport, exact number of tagged fish unknown

Table 2. Phase II tag returns from areas outside the areas stocked.

System	Date released	Recapture date	Recapture location
Cape Fear River	December 7, 2006	April 30, 2008	Roanoke River - Weldon
Albemarle Sound area	January 26, 1981	October 1981	2- lower Chesapeake Bay
		October 1981	3- upper Chesapeake Bay
		February 1982	2- upper Chesapeake Bay
		April 1982	3- upper Chesapeake Bay
		October – December 1981	12 – Pungo River
		October 1981	Long Shoal River
		January – March 1982	2 – Pungo River
		February 1982	Topsail Sound
		October – December 1982	4 – Pungo River
		October – December 1983	Pungo River
		January – February 1984	3 – Pungo River
	January 25,1983	December 1983	2 – Atlantic Ocean near Cape Lookout
		December 1983 – February 1984	4 – Pungo River
		January 1984	2 – Stumpy Point Bay
	December 16, 1983	November 1984	York River, VA
		May 1985	Indian River, DE
	December 19, 1990	June 1984	Mystic River, MA
		May 1993	Newport River, RI
	December 11, 1991	August 1992	Deep Creek, VA
		June 1997	Damariscotta River, ME
	January 10, 1996	February 1997	Pungo Creek
	December 12, 1996	September 1997	Neuse River above New Bern

Table 2.	**Continued.**		
System	**Date released**	**Recapture date**	**Recapture location**
Neuse River area	February 3, 1982	October – December 1982	Pungo River
		April 1983	Tar River below Rocky Mt.
		April – June 1983	Albemarle Sound
		July 1983	Conowingo Dam, MD
		July 1983	Hudson River, NY
	December 9, 1994	May 15, 1998	Albemarle Sound
	December 13, 1996	November 26, 1997	Pamlico River- Chocowinity Bay
	December 11, 1998	July 4, 2000	Croatan Sound- Manns Harbor
		February 3, 2001	Croatan Sound- Manns Harbor
		March 20, 2002	Roanoke River- Jamesville
		March 24, 2002	Mouth of Roanoke River
		March 28, 2002	Eastmost River
		April 7, 2002	Roanoke River above Jamesville
		April 7, 2002	Roanoke River- Plymouth
		April 29, 2002	Roanoke River- Scotland Neck
		May 11, 2002	Tar River- near Tarboro
		April 26, 2004	Scuppernong River
	December 6, 2002	June 26, 2006	Oregon Inlet
		November 18, 2007	Fire Island Inlet, NY
		November 1, 2008	Pamlico River – Durham Creek
	December 5, 2007	October 24, 2008	Pamlico River
		March 19, 2009	Chowan River – Rocky Hock Creek
Pamlico River area	January 28, 1983	January – March 1983	Alligator River 2 – Neuse River
		March 1983	2 – Off Cedar Island
		April – June 1983	Alligator River 2 – Albemarle Sound 4 – Neuse River
		July – September 1983	Alligator River
		October – December 1983	Chowan River 4 – Alligator River 6 – Albemarle Sound 6 – Neuse River Trent River 3 – Far Creek – Pamlico Sound
		January – February 1984	4 – Albemarle Sound Neuse River
	December 8, 1993	March 1996	Currituck Sound- Wright Memorial Bridge
		March 15, 1997	Neuse River- off Cherry Point
	December 9, 1994	May 1, 1999	Roanoke River

Table 2.	**Continued.**		
System	**Date released**	**Recapture date**	**Recapture location**
	December 9, 1994	January 5, 2002	Croatan Sound- Manns Harbor
		November 10, 2002	Croatan Sound –Manns Harbor
	January 10, 1996	April 22, 1998	Neuse River at Raleigh
		June 28, 1998	Cape Cod Canal, MA
		June 10, 2001	Providencetown, MA- Race Pt.
	December 8, 1999	November 29, 2000	Neuse River- New Bern
		May 18, 2001	Neuse River- New Bern
		May 20, 2001	Roanoke River- Weldon
		June 3, 2002	Neuse River- New Bern
		June 6, 2002	Trent River
	December 14, 2001	April 22, 2003	Neuse River – New Bern
		December 2, 2005	Coinjock Canal
		January 19, 2006	Currituck Sound Bridge
	December 11, 2003	July 15, 2004	Albemarle Sound- off Woodard's Marina
	December 9, 2005	April 4, 2007	Chowan River near Tunis
		May 15, 2007	Roanoke R - Weldon
		November 19, 2007	Neuse R – New Bern
		April 21, 2008	Roanoke R - Weldon
		October 23, 2008	Neuse River – New Bern
		January 10, 2009	Neuse River – New Bern

December 2008

During the fall 2008, a total of 91,962 Phase II striped bass were released in Upper Goose Creek. A total of 3,000 fish was tagged prior to release. Through December 2009, 21 tags have been returned, with all recaptures by hook and line and all between Greenville and the mouth of Pamlico River (Table 1).

Pamlico River Summary

In the Pamlico River area, a total of 1,262,484 Phase II striped bass have been stocked (Figure 1). Tagged fish released accounted for 37,629 of the total (Table 1) and 1,141 tags have been returned (3.0%). As with the other systems, these fish have contributed to the commercial and recreational harvest. These stockings have helped sustain the striped bass population during low levels of natural abundance. Returns from outside the Pamlico River area, other internal systems and waters outside North Carolina are shown in Table 2. Two tags from these stockings were returned from Massachusetts. Sixty tags have been returned from other internal waters of the State, with 51.7% of these returns from the ASMA.

Adult Tagging- Albemarle Sound Area

Hook and Line Tagging- 1990 – 2000

Since 1990, a total of 1,452 striped bass have been tagged and released through hook-and-line effort. The striped bass have ranged from 10.5 – 24 in (267 – 610 mm) TL. These fish have been tagged with dart, cinch-up, or internal anchor tags. Tagging has occurred throughout the Albemarle Sound area (Figure 2). The number of releases and recaptures are shown in Table 3 for each year. Seventy-two tags (5%) have been returned. The majority of the returns have been from the ASMA. One tag was returned from Far Creek, near Engelhard, NC in November 1996 (released April 1995- mouth of Perquimans River). A tag returned in May 1996, from Sandy Point, NJ, was released in Perquimans River in April 1995. In July 1997, a tagged fish was captured in Fresh Kills, Bayonne, NJ (Hudson River) that was tagged at Hwy 32- Albemarle Sound Bridge, 18 October 1995 (Table 4). No tag returns have occurred since 2001.

Eastern Albemarle and Croatan Sound Areas 1990 – 1995 and 2005 Tagging

During 1990 – 1995, tagging occurred in the eastern Albemarle Sound and portions of Croatan Sound from pound nets (Figure 2). A total of 1,329 striped bass was tagged and released. Two hundred and twenty-seven tags have been returned, with no returns occurring since 1999 (Table 5). Table 6 shows the tag returns from outside North Carolina's internal waters. In November 2005, a total of 19 striped bass were tagged and released from pound nets in eastern Albemarle Sound. No tags have been returned.

Roanoke River- Fish Wheel- 2002

During April through May 2002, the North Carolina Cooperative Fish and Wildlife Research Unit (Hewitt and Hightower 2002) utilized a fish wheel in Roanoke River, near Scotland Neck, NC to capture striped bass. A total of 729 striped bass were tagged with NCDMF internal anchor tags and released. Thirty-three tags (4.5%) have been returned and are shown by year in Table 7. One tag was returned from Pungo River, NC and two from the Blackwater River, VA. One tag was returned in 2007 from the Albemarle Sound near Reed Point.

Chowan River Pound Nets- 2003

Division staff tagged and released 419 striped bass from mid-April through early May 2003, out of pound nets in the Chowan River (south of Holiday Island to below Tunis). The returns are shown by year in Table 7. Five of the 15 returns were from the Roanoke River, near Weldon. No returns have occurred since 2005.

Virginia Division of Inland Game and Fish Commission (VIGFC) Blackwater, Nottoway, North Landing and Northwest Rivers

During April 2003, the VIGFC through electro-fishing efforts captured, tagged (tags supplied by NCDMF) and released 96 striped bass in the Blackwater and Nottoway rivers, VA (Figure 3). Nine tags have been returned, with 5 of the total from the Roanoke River, near Weldon (Table 7).

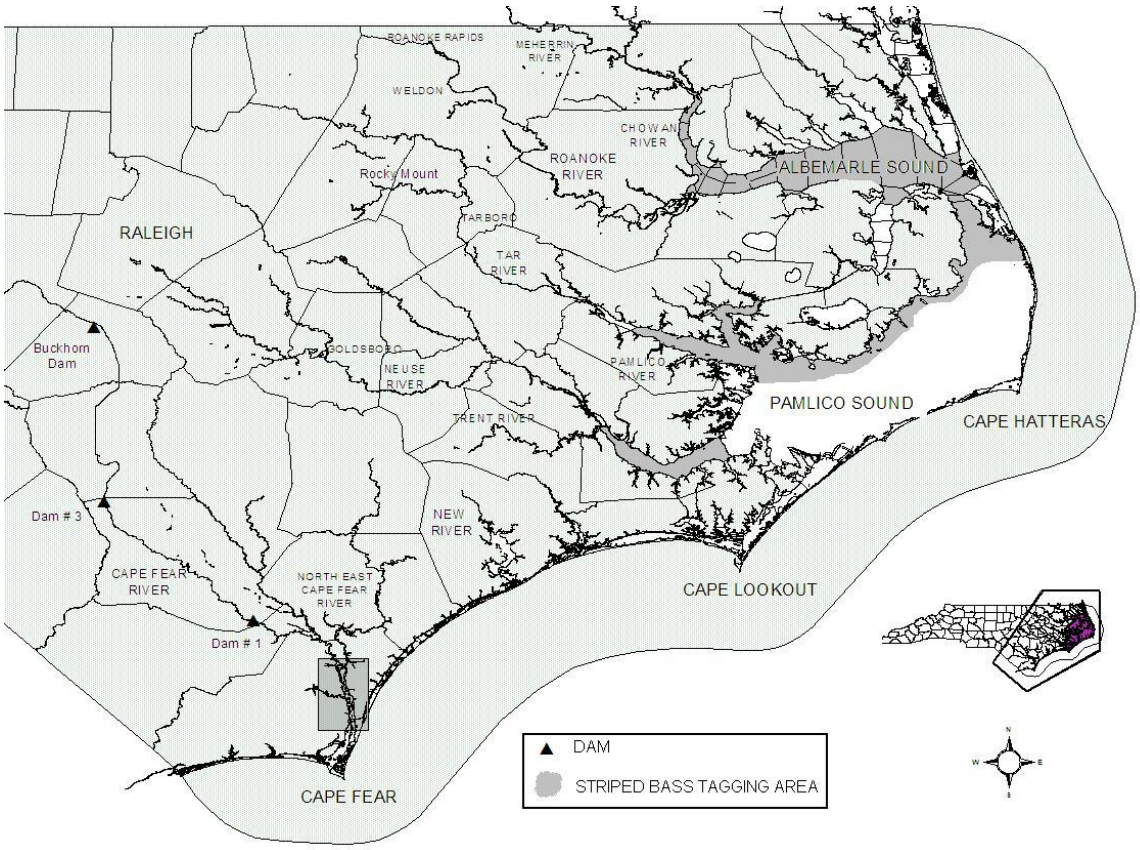

Figure 2. Striped bass tagging areas throughout coastal North Carolina, NC Division of Marine Fisheries projects.

Table 3. Number of adult striped bass tagged and released by NCDMF hook-and-line.

Year	Tagging location	Number tagged	Number returned	Percent return
1990	Batchelor Bay	15	0	
1992	Albemarle Sound area	108	5	4.6
1993	Albemarle Sound area	50	4	8.0
1993	Pasquotank River	63	1	1.6
1994	Pasquotank River	375	20	5.3
1994	Albemarle Sound area	124	7	5.6
1995	Albemarle Sound area	74	6	8.1
1996	Perquimans River	26	1	3.8
1997	Albemarle Sound area	42	0	
1998	Albemarle Sound area	107	1	0.9
1998	Perquimans River	30	2	6.7
1999	Albemarle/Croatan area	244	6	2.4
2000	Albemarle/Croatan area	194	19	9.8
	Total	**1,452**	**72**	

Table 4. Striped bass tag returns from outside North Carolina (hook-and-line tagging).

Date released	Release location	Recapture date	Recapture location	Number of days at large	Release/ Recapture length (mm, TL)
Apr 19, 1995	Perquimans River	May 10, 1996	Sandy Point, NJ	386	337/356
Oct 18, 1995	Albemarle S. - Hwy. 32 Bridge	Jul 18, 1997	Bayonne, NJ	638	279/559

A total of 26 striped bass were tagged and released by VIGFC in the North Landing and Northwest rivers, VA (Figure 3). Tagging efforts occurred in March and early April 2004. Four tags have been returned and three of these returns were from the Roanoke River (Table 7).

During April 2009, VIGFC tagged and released 22 striped bass in the Nottoway and Blackwater rivers in Virginia. The fish ranged from 16.6 – 20 inches TL. One tag was returned in November 2009, from the Chowan River Bridge (Edenhouse) (Table 7).

NCDMF Albemarle Sound Independent Gill Net Survey Tagging Fall 1990 – Spring 2009

Fall/Winter 1990 – 1991

The Albemarle Sound Independent Gill Net Survey (IGNS) was initiated in October 1990, with 245 striped bass being tagged from December 1990 through February 1991. A total of 55 tags have been returned from these tagging efforts. Tag returns by year are shown in Table 8. Returns of fish 18 in TL and larger and at large +8 days are presented in Table 9. Hook-and-line has accounted for 49.1% (n=27) of the returns; gill nets (36.4%) and the remainder were from pound nets and electro-fishing sampling. Eight tags were returned with no information. Twenty-six of the returns were from the Roanoke River, near Weldon. One return was from Chesapeake Bay, below W.P. Lane Bay Bridge (Annapolis, MD) in October 1995 (Table 10).

Fall/Winter 1991 – 1992

Three hundred and twenty-nine striped bass were tagged and released during the period November 1991 through February 1992. All fish were tagged in the Albemarle and Croatan sounds. A total of 69 (21%) tags have been returned (Table 8). Hook-and-line recaptures contributed 82.6% (n=57), gill nets and pound nets accounted for the remaining portion. All returns were from the ASMA. The returns from the spawning grounds of Roanoke River have accounted for over 45% of the returns.

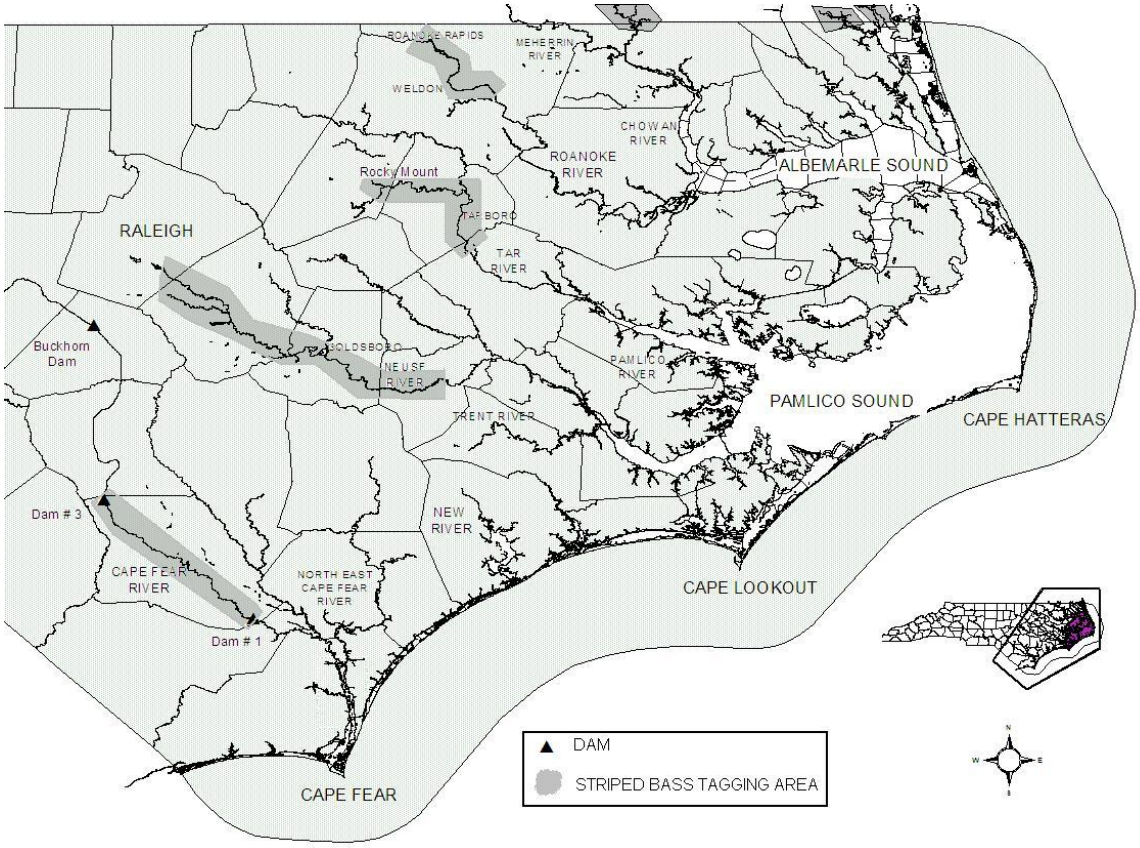

Figure 3. Striped bass tagging areas in North Carolina and Virginia, by North Carolina Wildlife Resources Commission and Virginia Department of Inland Game and Fish Commission.

Table 5. Number of adult striped bass tagged and released in the Albemarle Sound area from pound nets.

Year	Tagging location	Number tagged	Number returned	Percent return
1990	Batchelor Bay	275	34	12.4
1990	Eastern Albemarle Sound	420	69	16.4
1991	Eastern Albemarle Sound	183	30	16.3
1992	Eastern Albemarle Sound	88	18	20.4
1993	Eastern Albemarle Sound	209	39	18.7
1994	Eastern Albemarle Sound	77	5	6.5
1995	Eastern Albemarle Sound	352	66	18.7
1998	Chowan River	13	2	15.4
2005	Eastern Albemarle Sound	19	0	
	Total	**1,636**	**263**	

Table 6. Adult striped bass tag returns from outside the internal waters of North Carolina from eastern Albemarle Sound, NC pound net tagging.

Date released	Release location	Recapture date	Recapture location	Number of days at large	Release/ Recapture length (mm, TL)
Oct 2, 1995	Albemarle S.- near Caroon Pt.	Sep 9, 1996	Atlantic Ocean- south Oregon Inlet	342	517/523
Oct 13, 1995	Albemarle S.- near Caroon Pt.	May 8, 1996	Sakonnet Pt., RI	207	421/-
Oct 19, 1995	Albemarle S.- near Caroon Pt.	May 28, 1996	Stage Harbor, MA	222	432/-
Oct 19, 1995	Albemarle S.- near Caroon Pt.	Jan 12, 1999	Atlantic Ocean- east of Oregon Inlet	1,180	438/743

Table 7. Various adult striped bass tagging efforts in the Albemarle Sound area and returns.

Year/System	Number Tagged	Total number of returns	2002	2003	2004	2005	2007	2009	Return area
2002 Roanoke River- Fish Wheel (Hightower)	729	33	21	7	3	1	1		1- Pungo River, 2- Blackwater River, VA, remaining returns from ASMA or RRMA
2003 Chowan River- Pound nets (DMF)	419	15		7	6	3			5- Roanoke River- Weldon, remaining returns ASMA
2003 Blackwater and Nottoway rivers, VA (VIGFC)	96	9		4	2	3			5- Roanoke River- Weldon, remaining returns ASMA
2004 North Landing and Northwest rivers, VA (VIGFC)	26	3			1	3			2- Roanoke River- Weldon, 1- Plymouth
2009 Blackwater and Nottoway rivers, VA (VIGFC)	22	1						1	Chowan River Bridge

Fall/Winter 1992 – 1993

During November 1992 through February 1993 sampling period, 267 striped bass were tagged and released in the Albemarle and Croatan sound areas (Figure 2). A total of 36 (13.5%) tags have been returned from the tagging. Three returns had no information. Table 8 shows the tag returns by year. The majority of the returns have been from the Albemarle Sound and its tributaries. However, one tag return (July 1993) was from the Potomac River above Washington, DC (Table 10) and two returns have occurred from the Oregon Inlet area (Table 11). Two tag returns have occurred from the Pamlico Sound area (Stumpy Point and off Rodanthe) (Table 12). The majority of the returns have been from hook-and-line.

Fall/Winter 1993 – 1994

Through the IGNS, 166 striped bass were tagged and released in the Albemarle and Croatan sound areas during November 1993 through February 1994 (Table 8). Twenty-nine tags have been returned, seven of which were from the Roanoke River area. Recaptures by hook-and-line dominated the recapture gears.

Fall/Winter 1994 – 1995

A total of 776 striped bass were tagged and released during November 1994 – February 1995. Seventy-three tags have been returned (Table 8), of which 24 were from the spawning grounds in Roanoke River. A tag was returned from the Sakonnet River, RI, off Block Island in May 1996 from a fish trap (Table 10). In December 1996, a tag was returned from Pantego Creek, NC, taken by hook-and-line (Table 12).

Fall/Winter 1995 – 1996

Four hundred and sixty-four striped bass were tagged and released throughout the Albemarle and Croatan sound areas during the Fall/Winter 1995 – 1996 survey (Figure 2). A total of 42 (8.8%) tags have been returned (Table 8). Seven of the returns were from the spawning grounds in Roanoke River. Four returns were from outside the internal coastal waters of the State. One fish released in November 1995 was recaptured during December 1995 in the Atlantic Ocean, south of the US Army Corps of Engineers Pier, Duck, NC. During May 1996, a tagged fish was recaptured in the Atlantic Ocean, off Kill Devil Hills, NC (released February 1996) (Table 10). During April 1999, a tagged fish was recaptured in the Tar River near Rocky Mount, NC (Table 12). A tagged fish was captured in July 2000 in the Atlantic Ocean of Providencetown, MA. Ninety percent of the returns have been from hook-and-line.

Fall/Winter 1996 – 1997

During November 1996 through February 1997, 782 striped bass were tagged and released and 50 returns have occurred (Table 8). The majority of the returns were from the ASMA. Seven tags were returned from the Roanoke River, near Weldon. During April 2000, a tagged fish was captured in the Nottoway River, VA. Three tags were returned from outside the internal coastal waters of North Carolina. In May 1997, a tag was returned from the Atlantic Ocean, off Asbury Park, NJ. During 1997, a tagged fish was recaptured in the Kennebec River, ME (Table 10). A tag was returned from Carova Beach, NC, that was found on a dead striped bass in July 1997. Hook-and-line has accounted for the majority of the returns (n=33), followed by gill nets (n=7).

Fall/Winter 1997 – 1998

A total of 695 striped bass were tagged and released during November 1997 through February 1998. Fifty-five tags have been returned (Table 8), of which 10 were from the spawning grounds in Roanoke River. In November 1999, a tagged fish was captured at Bartlett's Reef, near Niantic, CT. Hook-and-line has been the primary recapture gear (n=39), followed by gill nets (n=7) and pound nets (n=4).

Fall/Winter 1998 – 1999

Through the IGNS, 1,054 striped bass were tagged and released during the fall/winter segment (Table 8). Eighty-seven tags have been returned, of which twenty-eight were from the Weldon area of Roanoke River. Over 96% of the returns have been from the internal waters of North Carolina. Seventy-six of the returns were from hook-and-line, with gill nets accounting for six returns and pound nets four.

Fall/Winter 1999 – 2000

During November 1999 through February 2000, 586 striped bass were tagged and released (Table 8). A total of 66 tags have been returned, and hook-and-line has accounted for 72% of the returns followed by gill nets (18.5%). Five of the returns have been from the Oregon Inlet area (Table 11), two from the Pamlico River area (Table 12) and one from Nottoway River, VA.

Fall/Winter 2000 – 2001

A total of 382 striped bass was tagged and released during the Fall/Winter survey (Table 8). Thirty tags have been returned since release. Approximately 87% of the returns have been from the ASMA. Two tagged fish were captured in Stumpy Point Bay. One tag was returned from Pamlico River and one from Indian River Inlet, DE. Twenty-five of the returns were from hook-and-line and gill nets and pound nets accounted for the remainder.

Fall/Winter 2001 – 2002

During November 2001 through February 2002, 537 striped bass were tagged and released through the IGNS (Figure 2). Thus far 36 tags have been returned (Table 8) and all from the ASMA. Returns from hook-and-line have accounted for 75% of the total.

Fall/Winter 2002 – 2003

The Fall/Winter IGNS segment resulted in 428 striped bass being tagged and released in the ASMA, with 29 tags being returned (Table 8). Three of the returns have been from the Oregon Inlet area (Table 9) and one from the Blackwater River, VA (Table 12). All other returns have been from the ASMA. Over 88% of the returns have been from hook-and-line.

Fall/Winter 2003 – 2004

A total of 894 striped bass were tagged and released during the 2003 – 2004 Fall/Winter gill net survey (Table 8). Fifty-four tags have been returned, with 89.6% of the returns from the ASMA. Two tags were returned from Wysocking Bay, one from Stumpy Point Bay, one from Pantego Creek (Table 12) and one from Cape May, NJ (Table 10). Hook-and-line accounted for 76% of the returns.

Table 8. Number of adult striped bass tagged and released in the Independent Gill Net Survey - Fall-Winter Segment (Nov – Feb), Albemarle and Croatan sound areas.

Year	No. Tag	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Returns(no data)
1990 – 91	245	24	10	6	4	1		1		1											55 (8)
1991 - 92	329		36	11	13	4	5														69
1992 – 93	267			11	8	6	2	4	2												36 (3)
1993 – 94	166			1	10	7	7	2													29 (2)
1994 – 95	776					34	21	7	5	2	1										73 (3)
1995 – 96	464					2	20	8	1	4	3		2				1				42 (1)
1996 – 97	782						7	26	4	7	1	2									50 (3)
1997 – 98	695							2	26	9	6	3	4								55 (5)
1998 – 99	1,054								4	49	13	12	4	1	2		1				87 (1)
1999 – 00	586										28	20	10	5	2						66 (1)
2000 – 01	382										1	12	10	7							30
2001 - 02	537												24	8	2	1		1			36
2002 – 03	428												4	11	6	6	2				29
2003 – 04	894														27	16	8	1	2		54
2004 - 05	546															32	9		1		42
2005 - 06	676															2	37	11	3		53
2006 - 07	238																	3			3
2007 - 08	835																	1	47	21	69
2008 -09	533																			21	21
Total	**10,433**	**24**	**46**	**29**	**35**	**54**	**62**	**50**	**42**	**72**	**53**	**49**	**58**	**32**	**39**	**57**	**58**	**17**	**53**	**42**	**899**

Table 9. Recovery matrix for striped bass tagged (≥18 inch TL and at large +8 days) during the Fall/Winter Albemarle Sound Independent Gill Net Survey.

Year	No. Tag	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	No. Returned
1991 - 92	161	22	8	7	4	2														43
1992 – 93	246		9	8	6	1	3													27
1993 – 94	156		1	10	7	5	2													25
1994 – 95	317				16	13	3	4	1											37
1995 – 96	239				1	15	6	1	1							1				25
1996 – 97	287					3	13	3	4	1	1									25
1997 – 98	248							19	4	3	1	1								28
1998 – 99	399							2	33	9	2	2		1						49
1999 – 00	292									22	13	7	4	2						48
2000 – 01	239									1	11	9	3							24
2001 - 02	192											20	6		1					27
2002 – 03	206											3	8	3	1	1				16
2003 – 04	467													18	8	7		1		33
2004 - 05	379														24	8		1		34
2005 – 06	389														1	30	10	1		42
2006 – 07	95																2			2
2007 – 08	76																	7	1	8
2008 - 09	144																		8	8
Total	**4,532**	**22**	**18**	**25**	**34**	**39**	**27**	**29**	**43**	**36**	**28**	**42**	**21**	**24**	**35**	**47**	**12**	**10**	**9**	**501**

Fall/Winter 2004 – 2005

Through the IGNS, 546 striped bass were tagged and released in the ASMA (Table 8). Forty-two tags have been returned and all except one (Pungo River) has been from the ASMA. Seven of the returns were from the spawning grounds, Roanoke River. Hook-and line has accounted for 74.4% of the returns, gill nets 16.3% of the returns and pound nets 9.3%.

Fall/Winter 2005 – 2006

A total of 676 striped bass was tagged and released during the Fall/Winter segment (Table 8). Fifty-three tags have been returned, with 96.2% of the returns from the ASMA. Twelve of the returns were from the spawning grounds in April 2006 and three during the spring 2007. Over 71% of the returns were from hook-and-line and 21.1% from gill nets.

Fall/Winter 2006 – 2007

The IGNS Fall/Winter segment resulted in 238 striped bass being tagged and released in the ASMA. Three tags have been returned (Table 8).

Fall/Winter 2007 – 2008

A total of 835 striped bass were tagged and released throughout the ASMA. The returns by year are shown in Table 8. A total of 69 tags have been returned, with 65.2% of the returns from the spawning grounds in Roanoke River. Hook and line has been the dominant capture gear. A tagged fish was recaptured in Neuse River above New Bern in August 2009.

Fall/Winter 2008 – 2009

During the Fall/Winter segment a total of 533 striped bass were tagged and released in the ASMA. Twenty-one tags have been returned and 50% of the returns were from the Roanoke River during the spring 2009 (Table 8). Eighty-five percent of the returns were from hook and line.

Fall/Winter Recoveries Summary

The number of striped bass tagged and recoveries by year from the Fall/Winter IGNS are presented in Table 8. The number of returns by year are shown in Table 9, for fish 18 inch TL or larger at release and at large for eight or more days.

Tag returns from fish tagged during the Fall/Winter survey have occurred from outside the internal waters of North Carolina (Table 10), the Oregon Inlet area (Table 11) and internal waters of the State, outside the ASMA (Table 12).

During the Fall/Winter survey, striped bass 28 inches TL and larger have been captured, tagged and released. Table 13 shows the number tagged and the returns.

Spring 1993

During the 1993 spring gill net survey, 106 striped bass were tagged and released in the western Albemarle Sound (Figure 2). Eleven tags have been returned from the ASMA (Table 14).

Table 10. Striped bass tag returns from outside the internal coastal waters of North Carolina, from the Independent Gill Net Survey tagging.

Date released	Release location	Recapture date	Recapture location	Number of days at large	Release/ Recapture length (mm, TL)
Dec 8, 1991	Albemarle S.- Dewey's Pier	Oct 15, 1995	Chesapeake Bay- W.P. Lane Bay Bridge, MD	1,406	452/-
Jan 23, 1992	Alligator River-mouth	Apr 14, 1993	Potomac River, MD	446	558/-
Feb 24, 1995	Albemarle Sound- Laurel Pt.	May 3, 1996	Sakonnet River, RI	433	375/-
Nov 16, 1995	Albemarle Sound- Pledger Landing	Dec 15, 1995	Atlantic Ocean- off Duck	29	542/-
Dec 14, 1995	Croatan S- north of bridge	Jul 23, 2000	Atlantic Ocean- Providencetown, MA	1,681	366/711
Feb 12, 1996	Perquimans River- mouth	May 18, 1996	Sakonnet River, RI	95	453/-
Feb 21, 1996	Croatan Sound- north of bridge	Jun 2, 1997	Atlantic Ocean- off Kill Devil Hills	466	543/-
Apr 9, 1996	Off mouth of Roanoke River	May 20, 1996	Atlantic Ocean- south Oregon Inlet	41	806/-
Nov 14, 1996	Albemarle Sound- Dewey's Pier	Jun 11, 1997	Kennebec River, ME	209	429/432
Nov 19, 1996	Off Peter Mashoes Creek	May 10, 1997	Asbury Park, NJ	172	627/660
Dec 20, 1996	Albemarle Sound- Caroon Pt	Jul 25, 1997	Atlantic Ocean- off Corolla	217	410/686
Feb 12, 1998	Bull Bay	Nov 25, 1999	Bartlett's Reef- Niantic, CT	286	451/686
Apr 1, 2000	Western Albemarle Sound	Oct 20, 2001	Atlantic Ocean- off Belmar, NJ	567	654/737
Jan 24, 2001	Alligator River-mouth	Jun 23, 2003	Indian River, DE	880	476/965
Dec 9, 2003	Croatan Sound- north of bridge	Oct 30, 2004	Cape May, NJ	325	838/-
Apr 16, 2004	Western Albemarle Sound	Nov 5, 2007	Island Beach State Park, NJ	1,298	876/-

Table 11. Striped bass tag returns from the Oregon Inlet area, fish tagged through the Independent Gill Net Survey.

Date released	Release location	Recapture date	Number of days at large	Release/recapture length (mm, TL)
Dec 15, 1992	Mouth of Alligator River	Mar 16, 1997	1,551	492/572
Jan 29, 1993	Albemarle Sound-Durants Island	Dec 20, 1994	690	800/-
Feb 2, 1995	Bull Bay	Apr 4, 1997	791	511/-
Feb 22, 1995	Albemarle Sound – Yeopim River	Jul 19, 1998	1,242	539/-
Dec 15, 1995	Mouth of Alligator River	Apr 14, 1999	1,215	446/533
Mar 28, 1996	Batchelor Bay	Jun 7, 1998	801	639/686
Apr 17, 1996	Albemarle Sound – Mackeys	Jun 14, 1998	788	603/762
Nov 20, 1996	Off Peter Mashoes Cr.	Feb 7, 1999	809	487/559
Nov 19, 1997	Albemarle S- Hwy 32 Bridge	Apr 9, 1998	141	312/356
Jan 22, 1998	Albemarle Sound - Perquimans River	Aug 18, 1998	208	533/-
Dec 17, 1997	East of Bull Bay	May 23, 1999	522	420/508
Nov 6, 1998	Off Yeopim River	Jul 29, 1999	265	412/-
Dec 10, 1998	Croatan S- Manns Harbor	Jun 23, 1999	195	527/552
May 7, 1999	Albemarle S.- Mackeys	Jun 23, 1999	47	616/-
Mar 21, 1999	Batchelor Bay	Dec 4, 1999	258	574/584
Dec 17, 1999	Albemarle S.- Hwy 32 bridge	May 1, 2000	135	468/-
Dec 7, 1999	Mouth of Alligator River	Oct 17, 2001	614	552/584
Jan 12, 2000	Bull Bay	May 14, 2000	122	545/572
Feb 9, 2000	Off Perquimans River	Jun 14, 2000	126	672/-
Feb 10, 2000	Off Perquimans River	Oct 17, 2001	614	552/584
Mar 24, 2000	Edenton Bay	May 28, 2000	65	451/457
Mar 16, 2000	Albemarle S.- Black Walnut Pt.	Oct 11, 2000	209	519/-
Apr 14, 2000	Albemarle S.- Black Walnut Pt.	Aug 31, 2001	504	686/730

Date released	Release location	Recapture date	Number of days at large	Release/recapture length (mm, TL)
Apr 8, 2001	Albemarle S. – Mackeys	May 24, 2001	46	667/-
Apr 8, 2002	Batchelor Bay	Jun 19, 2003	437	756/762 (F)
Nov 6, 2002	Croatan Sound	Nov 27, 2002	21	580/-
Feb 6, 2003	Off Perquimans River	Aug 25, 2004	565	673/851
Feb 21, 2003	Bull Bay	Dec 15, 2004	662	-/813
Apr 20, 2004	Batchelor Bay	Nov 26, 2004	220	673/- (M)
Nov 3, 2004	Albemarle Sound-Yeopim River	Nov 25, 2005	387	451/464
Apr 27, 2005	Batchelor Bay	Aug 2, 2005	97	552/- (M)
May 2, 2005	Batchelor Bay	Oct 9, 2006	525	635/- (F)
Jan 31, 2006	Croatan Sound	Nov 6, 2007	644	660/-

Table 12. Striped bass tag returns from outside the Albemarle Sound Management Area, fish tagged through Independent Gill Net Survey.

Date released	Release location	Recapture date	Recapture location	Number of days at large	Release/recapture length (mm, TL)
Jan 7, 1993	Mouth Perquimans River	Jan 12, 1997	Pamlico Sound- Stumpy Pt	1,465	477/787
Jan 7, 1993	Mouth of Perquimans River	Jan 17, 1993	Pamlico Sound- off Rodanthe	10	510/-
Feb 25, 1995	Mouth Edenton Bay	Dec 19, 1996	Pantego Creek	297	312/470
Jan 5, 1996	Off Black Walnut Pt	Apr 17, 1999	Tar River- Rocky Mount	1,197	394/521
Feb 10, 1996	Near Bull Bay	May 11, 2002	Blackwater River, VA	3,330	410/476
Nov 20, 1996	Croatan S-Manns Harbor	Apr 30, 2000	Nottoway River, VA	1,256	571/610
Nov 3, 1998	Mackey's Creek	Nov 30, 1998	Pamlico Sound- Stumpy Pt	27	417/495
Mar 28, 1998	Batchelor Bay	May 8, 1999	Blackwater River, VA	406	502/-
Mar 2, 1999	Salmon Creek	Mar 16, 2000	Pamlico River	379	520/584
Mar 12, 1999	Mackey's Creek	Dec 7, 2001	Pungo River	1,000	540/-
May 17, 1999	Near Black Walnut Pt	Jun 11, 1999	Pamlico Sound	25	536/737

Table 12. Continued **Date released**	**Release location**	**Recapture date**	**Recapture location**	**Number of days at large**	**Release/recapture length (mm, TL)**
Apr 15, 1999	Albemarle S. – Swan Bay	Feb 28, 2009	Neuse River at New Bern	3,603	406/- (M)
Feb 9, 2000	Central Albemarle Sound	Mar 10, 2003	Upper Pamlico River	1,126	470/638
Feb 16, 2000	Near Bull Bay	Apr 4, 2004	Nottoway River	1,507	489/635
Feb 17, 2000	Bull Bay	Jul 28, 2001	Pamlico River- Blount's Creek	526	473/-
Apr 6, 2000	Mackey's Creek	Feb 4, 2001	Pamlico River- Hills Creek	304	565/737
Apr 18, 2000	Western Albemarle S	Nov 22, 2000	Trent River	218	571/-
Nov 14, 2000	Near Alligator River	Aug 11, 2003	Pamlico River	1,000	438/495
Nov 15, 2000	Alligator River- mouth	Nov 28, 2000	Stumpy Point Bay	13	533/-
Dec 13, 2000	Croatan Sound- Manns Harbor	Feb 15, 2001	Stumpy Point Bay	64	540/-
Apr 1, 2001	Mackey's Creek	Jun 30, 2001	Pamlico River- Goose Creek	90	566/-
Apr 22, 2001	Mackey's Creek	Jun 7, 2001	Bogue Sound	46	502/-
Apr 14, 2001	Batchelor Bay	Nov 12, 2001	Pungo River	222	534/584
Apr 15, 2001	Western Albemarle Sound	May 4, 2003	Nottoway River	750	413/483 (M)
Apr 2, 2002	Western Albemarle Sound	May 25, 2002	Pungo River	53	546/559 (F)
Nov 20, 2002	Bull Bay	Apr 17, 2004	Blackwater River, VA	513	394/451
Apr 22, 2003	Western Albemarle Sound	Mar 18, 2006	Pamlico River- RR Trestle	1,060	381/559 (M)
Dec 12, 2003	Near Bull Bay	Jun 24, 2004	Pantego Creek	194	464/533
Jan 8, 2004	Eastern Albemarle Sound	Feb 7, 2004	Stumpy Point Bay	30	514/559
Jan 22, 2004	Near Perquimans River	Mar 9, 2004	Wysocking Bay	46	489/-
Jan 6, 2004	Near Alligator River	Mar 11, 2004	Wysocking Bay	64	463/-
Jan 4, 2005	Croatan Sound- Manns Harbor	Jun 18, 2005	Pungo River	165	591/571

Table 12. Continued Date released	Release location	Recapture date	Recapture location	Number of days at large	Release/recapture length (mm, TL)
Apr 19, 2005	Western Albemarle Sound	Jun 10, 2005	Pungo River	52	584/525 (F)
Dec 9, 2005	Alligator River- mouth	Jun 29, 2006	Pamlico Sound- behind Hatteras	202	571/-
Apr 14, 2007	Albemarle S – off Mackeys	Dec 20, 2008	Neuse River – New Bern	615	540/- (M)
Dec 20, 2007	Albemarle S – off Little River	Aug 4, 2009	Neuse River – above New Bern	592	312/533

Table 13. Total number of striped bass tagged and released, 28 inches (TL) and larger through Independent Gill Net Survey and returns by area.

Segment/ Year	Total tagged	Number tagged 28 inches and larger	Percent of total – fish 28 inches and larger	Number/ percent returns Oregon Inlet area	Number/ percent returns outside NC internal waters	Number/ percent returns outside ASMA
Fall/Winter 1992-1993	267	4	1.5	1 (25%)		
Fall/Winter 1993-1994	166	2	1.2			
Fall/Winter 1994-1995	776	1	0.1			
Spring 1995	553	3	0.5			
Spring 1996	406	1	0.2		1 (100%)	
Fall/Winter 1997-1998	695	1	0.1			
Fall/Winter 1999-2000	586	2	0.3			
Spring 2000	627	1	0.1			
Fall/Winter 2000-2001	382	1	0.2			
Spring 2001	648	5	0.7			
Spring 2002	531	2	0.4	1 (F) (50%)		
Fall/Winter 2002–2003	428	2	0.5	1 (50%)		
Spring 2003	299	6	2.0			
Fall/Winter 2003–2004	894	6	0.7		1 (16.7%)	

Segment/ Year	Total tagged	Number tagged 28 inches and larger	Percent of total – fish 28 inches and larger	Number/ percent returns Oregon Inlet area	Number/ percent returns outside NC internal waters	Number/ percent returns outside ASMA
Spring 2004	600	6	1.0		1 (16.7%)	
Fall/Winter 2004-2005	546	1	0.1			
Spring 2005	414	3	0.7			
Fall/Winter 2005–2006	676	2	0.3			
Spring 2006	488	2	0.4			
Fall/Winter 2006–2007	238	0	-			
Spring 2007	228	8	3.5			
Fall/Winter 2007–2008	835	3	0.3			
Spring 2008	732	0				
Fall/Winter 2008-2009	533	1	0.1			
Spring 2009	403	2	0.5			1 (50%) (F)

*F- female

Table 14. Number of adult striped bass tagged and released in the Independent Gill Net Survey – Spring Segment (Mar – May), Western Albemarle Sound area.

Year Spring	No. tag	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Returned (no data)
1993	106	7	1	2	1														11
1994	64		2	2															4
1995	553			8	10	3	2												24 (1)
1996	406				9	3	5	2	1										20
1997	582					5	2	1	1				1						11 (1)
1998	582						3	4	1										8
1999	785							12	7	4	2	1		2	1			1	31 (1)
2000	627								5	8	1								14
2001	648									15	8	2							25
2002	531										24	4	2	1					31
2003	299											8	6	2	2				18
2004	600												5	3		1	1		10
2005	414													4	10				14
2006	488														6	4	3		13
2007	228															1	4		5
2008	732																26	21	47
2009	403																	10	10
Total	**8,048**	**7**	**3**	**12**	**20**	**11**	**12**	**19**	**15**	**27**	**35**	**15**	**14**	**12**	**19**	**6**	**34**	**32**	**296**

Spring 1994

Sixty-four fish were tagged and released during the 1994 IGNS and 4 tags have been returned (Table 14).

Spring 1995

During March – May 1995, 553 striped bass were tagged and released during the survey (Figure 2). Twenty-four tags have been returned (Table 14), from the ASMA, with no returns since 1998.

Spring 1996

A total of 406 fish were tagged and released in the western Albemarle Sound. A total of 20 tags have been returned (Table 14). All tag returns have been from the ASMA, except one. During May 1996, a tag was returned from the Atlantic Ocean, just south of Oregon Inlet, NC (released April 1996). No returns have occurred since 2000.

Spring 1997

The spring gill net survey resulted in 582 striped bass tagged and released, of which 11 have been returned (Table 14). All returns were from the ASMA or the Roanoke River.

Spring 1998

During March – May 1998, 582 striped bass were tagged and released through the IGNS. Eight tags have been returned, all from the Albemarle Sound area (Table 14).

Spring 1999

During the 1999 spring gill net survey, 785 striped bass were tagged and released in the western Albemarle Sound area. Thirty-one tags have been returned (Table 14). Two of the returns (Jun 1999 and Dec 1999) were from the Oregon Inlet area (Table 11), one from the Pungo River (Dec 2001), one from the Pamlico River (Mar 2000) and one from Pamlico Sound (Jun 1999) (Table 12). In February 2009, a tagged fish was recaptured in the Neuse River at New Bern (Table 12).

Spring 2000

The spring gill net survey resulted in 627 striped bass being tagged and released (Table 14). A total of 14 tags have been returned. Three returns were from the Oregon Inlet area. A tag was returned from the Trent River (Nov 2000) and the Pamlico River (Feb 2001). In October 2001, a recapture occurred in the Atlantic Ocean off Balmar, NJ (Table 10).

Spring 2001

A total of 648 striped bass was tagged and released during the spring survey and 25 tags have been returned (Table 14). In May 2001, one tag was returned from the Oregon Inlet area. Three tags were returned from internal waters outside the ASMA (Pamlico River, Pungo River and Bogue Sound) (Table 12).

Spring 2002

The IGNS crews tagged and released 531 striped bass in the western Albemarle Sound area, March – May 2002 (Table 14). Thirty-one tags have been returned thus far and all returns, except two (Oregon Inlet and Pungo River) have been from the ASMA.

Spring 2003

During the spring segment of the gill net survey, 299 fish were tagged and released and 18 tags have been returned (Table 14). All returns have been from the ASMA, except one (Pamlico River- Washington).

Spring 2004

The spring gill net survey resulted in 600 striped bass being tagged and released in the western Albemarle Sound area, (Table 14). A total of 10 tags have been returned, all from the ASMA except one (Oregon Inlet).

Spring 2005

During March – May, gill net crews tagged and released 414 striped bass (Table 14). Fourteen tags have been returned, with one of the returns from the Pungo River (Jun 2005) (Table 12).

Spring 2006

The spring gill net survey resulted in 488 striped bass being tagged and released in the western Albemarle Sound area (Table 14). Thirteen tags have been returned, all from the ASMA.

Spring 2007

During March – May, 228 striped bass were tagged and released in the western Albemarle Sound area (Table 14). Five tags have been returned. One of the returns was from the Neuse river at New Bern (Dec 20, 2008) (Table 12).

Spring 2008

The spring gill net survey resulted in 732 striped bass being tagged and released in the ASMA (Table 14). Forty-seven tags have been returned, with 9 of the returns from the Roanoke River near Weldon.

Spring 2009

A total of 403 striped bass were tagged and released in the ASMA during the spring segment of the IGNS. Ten tags have been returned and all were from the ASMA (Table 14).

Spring Recoveries Summary

The number of striped bass tagged and recoveries by year from the spring segments of the IGNS are shown in Table 14. The number of returns by year, from fish that were 18 inches (TL) or larger at release and at large for eight or more days are shown in Table 15.

Tag returns from fish tagged during the spring survey in western Albemarle Sound have occurred from outside the internal waters of North Carolina (Table 10), the Oregon Inlet area (Table 11) and internal waters of the State, outside the ASMA (Table 12).

During the spring segments, 39 striped bass 28 inches TL or larger were tagged and released. The number of fish, 28 inches and larger tagged is higher in the spring survey (n=39) than the Fall/Winter survey (n=26) (Table 13).

Striped Bass Spawning Stock Tagging- 1988 – 2009

Tagging of Roanoke River spawners was intended to evaluate the possible contribution of North Carolina striped bass to the Atlantic migratory stocks. The tagging of adult striped bass from the Roanoke River area would also provide timely information on the utilization (commercial and recreational) and migration patterns of Roanoke-Albemarle striped bass.

Adult striped bass participating in the Roanoke River spawning run were captured for tagging from the Roanoke River and Batchelor Bay area of western Albemarle Sound. Primary capture methods were pound nets, electro-shocking, hook-and-line, and anchored gill nets. Size and age data was obtained from at least 10% of the striped bass captured. Healthy striped bass were marked with internal anchor (15 or 32 mm) tags. Prior to 1992, some smaller fish were tagged with cinch-up spaghetti tags or dart tags. Since 1990, the NCWRC and NCDMF have worked cooperatively on the Roanoke River spawning stock tagging efforts.

Spring 1988 – 1990

During March through May 1988 – 1990, striped bass were tagged in the Roanoke River and Batchelor Bay area's (Figure 3). Fish were obtained from pound nets, gill nets and through electro-shocking. A total of 399 fish was tagged and released during the three years (Table 16). No tag returns have occurred since 1996.

Spring 1991

Tagging efforts for 1991 were concentrated in the upper Roanoke River area, Weldon to Gaston. With the aid of the NCWRC staff and electro-shocking boats, project personnel captured 2,005 striped bass and tagged and released 1,657 of these fish between April 15 and June 10, 1991. Of those fish marked and released, 1,357 were male, 292 were female and eight fish were unsexed. Sizes of fish ranged from 13 – 33 inches (330 – 838 mm) TL. All fish were tagged with NCDMF or USFWS internal anchor tags. The remainder of the fish (348) were not tagged due to time constraints or condition of the fish.

Of the 1,657 tagged fish, 179 (10.8%) have been returned. The number of returns by year are presented in Table 16. Hook-and-line returns have accounted for the majority of the recaptures. All of the returns have been from the Albemarle Sound and its tributaries, except two. During December 1991, a tagged striped bass (18 in TL) was caught in the Atlantic Ocean at Cape Hatteras, NC. The fish was at large 216 days, was taken approximately 236 miles from the release site, and had grown approximately one inch. In

August 1999, a tagged fish was captured in the Chesapeake Bay at Thomas Point Light (Table 17). Over 50% of the returns have been from the spawning grounds in Roanoke River. No tags have been returned since 1999.

Table 15. Recovery matrix for striped bass tagged (≥18 inch TL and at large +8 days) during the Spring Independent Gill Net Survey, Albemarle Sound area.

Year Spring	No. tag	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	No. Returned
1993	100	3	1	2	1														7
1994	60		2	2															4
1995	317			7	7	2	1												17
1996	370				6	3	4	2											15
1997	334					1	1	1	1										4
1998	330						3	4	1										8
1999	506							9	6	3	1	1		1					21
2000	424								3	6	1								10
2001	479									12	5	1							18
2002	433										18	4	2	1					25
2003	215											6	3	1	1				11
2004	349												3	2		1			6
2005	328													3	7				10
2006	325														5	1	2		8
2007	139															1	4		5
2008	124																11	4	15
2009	149																	7	7
Total	**4,982**	**3**	**3**	**11**	**14**	**6**	**9**	**16**	**11**	**21**	**25**	**12**	**8**	**8**	**13**	**3**	**17**	**11**	**191**

Table 16. Number of adult striped bass tagged and released on the spawning grounds Roanoke River.

Year	No. tag	1988 – 91	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	No. Returns (no data)
1988	37	8	1																		9
1989	27	1																			1
1990	335	18	7	3	4		1														33
1991	1,657	44	57	40	13	3	5	6		1											179 (10)
1992	2,453		73	127	64	28	19	19	4	5							1				360 (20)
1993	2,338			88	75	50	29	23	6	5	1						1				285 (7)
1994	9				1	2															3
1995	1,265					28	48	41	7	4	1										133 (4)
1996	1,378						43	40	19	15	2		2								128 (7)
1997	2,167							123	74	45	14	7	5				1				288 (19)
1998	2,060								105	74	27	11	20								243 (6)
1999	2,177									89	66	31	23				1		1	1	217 (5)
2000	1,970										85	71	32	2	3						194 (1)
2001	2,647											122	159	24	10	3	3			1	323 (1)
2002	2,032												123	33	13	7	3				180 (1)
2003	3,146													97	119	76	31	10	1	2	336
2004	1,530														53	65	20	7	3	2	150
2005	4,104															161	163	52	5	6	387
2006	5,020																224	189	28	9	450
2007	2,796																	122	44	11	177
2008	4,153																		188	189	377
2009	3,271																			171	171
Total	**46,572**	**71**	**138**	**258**	**157**	**111**	**145**	**252**	**215**	**238**	**196**	**242**	**364**	**156**	**198**	**312**	**448**	**380**	**270**	**392**	**4,624**

Table 20. Recovery matrix for striped bass tagged (≥18 inch TL and at large +8 days) on the spawning grounds Roanoke River.

Year	No. tag	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	No. returns
1991	402	16	19	14	2																51
1992	1,167		41	68	30	9	10	6	1	4							1				170
1993	2,187			52	67	45	27	25	6	5	1					1					229
1994	9				1	2															3
1995	1,080					24	36	35	7	3	1										106
1996	583						16	24	6	8	1										55
1997	1,289							69	44	22	6	4	3				1				149
1998	1,333								59	55	16	5	12		1						148
1999	1,545									44	51	22	15						1		133
2000	1,192										41	55	24	1	2						123
2001	1,827											81	126	17	7	2	2			1	236
2002	1,766												81	31	13	6	3				134
2003	1,949													69	88	46	22	7		1	233
2004	780															50	11	3	3	2	69
2005	2,905															115	134	42	3	5	299
2006	4,350																177	187	28	8	400
2007	2,147																	83	35	10	128
2008	951																		60	57	117
2009	1,467																			66	66
Total	**28,929**	**16**	**60**	**134**	**100**	**80**	**89**	**159**	**123**	**141**	**117**	**167**	**261**	**118**	**111**	**220**	**351**	**322**	**130**	**150**	**2,849**

Spring 1992

In the spring of 1992, tagging efforts were again concentrated in the upper Roanoke River around the Weldon and Gaston areas (Figure 3). From April 21 through June 15, 2,453 striped bass were captured by electro-shocking, tagged with internal anchor tags and released. Of the total 2,095 were males and 336 females. The size of the fish ranged from 13 to 33 inches (330 – 838 mm) TL.

Three hundred and sixty tags (14.7%) have been returned since 1992 tagging on the spawning grounds. Seventeen of the returns had no information. Table 16 shows the returns by year. Forty-seven percent (n=168) of the striped bass tag returns were from the Roanoke River, while 163 returns were from the Albemarle Sound area. Three tags were returned from the Pungo River area (1995) (Table 18). In October 1996, a tag was returned from the Lynnhaven Inlet, VA (Table 17) and one from Pamlico Sound, off Clam Shoal (behind Hatteras), in November 1996. Hook-and-line returns have accounted for 63.8% (n=226), gill nets 23.2% (n=82); pound nets 4.8% (n=17) and electro-shocking 4.2% (n=15). A tag was returned in 2006, from Albemarle Sound, off Yeopim River, the first return since 1999.

Spring 1993

During 1993, WRC and DMF captured and tagged 2,452 striped bass of which 2,338 were released with internal anchor tags. The number of male striped bass totaled 1,687 (68.8%), while the number of females was 735 (30%). The sex of 30 fish could not be determined.

Of the 2,338-tagged fish, 285 (12.2%) have been returned (Table 16). One hundred twenty-seven (44.7%) returns came from the Roanoke River, with 149 (52.5%) being returned from the ASMA. A recapture occurred in May 1996, from Barnegat Bay, NJ (Table 17). This fish was 25 inch (635 mm) TL and weighed 6 pounds (2.7 kg). One tag was returned in June 1997, from the Meherrin River, below the dam at Emporia, VA. In November 1997, a tag was returned from the Neuse River, Simmons Bay below New Bern, NC (Table 18). This fish was at large 1,649 days and recaptured ~280 miles from the release site**.** Hook-and-line has been the most productive recapture gear accounting for 58.4% (n=166) of the returns, followed by pound nets with 15.1% (n=43), gill nets 13% (n=37), electro-shocking 4.6% (n=13) and the remaining returns were from other gears. Seven mortalities were found floating downstream of the tagging area.

Spring 1994

Tagging efforts on the spawning grounds during the spring 1994 were greatly reduced. This was a result of DMF having to combine two striped bass projects into one and reduce the activities due to funding restrictions and personnel. Nine striped bass were tagged and released during May, by WRC personnel. Three recaptures have occurred (Table 16), two of which were from the Roanoke River during the spring 1995.

Spring 1995

During the spring 1995, tagging efforts were concentrated between Halifax and Weldon, NC (Figure 3). Due to the low water level of the river the Roanoke Rapids and Gaston areas could not be sampled. A total of 1,949 striped bass were captured, 1,506

were males and 443 were females. A cooperative effort with the NCWRC staff resulted in the capture, tagging and release of 1,265 striped bass.

Table 17. Roanoke River spawning stock tag returns from outside the internal coastal waters of North Carolina.

Date released	Recapture date	Recapture location	Number of days at large	Release/ Recapture length (mm, TL)
May 20, 1990	Apr 9, 1992	James River, VA	689	420/- (M)
May 21, 1991	Dec 23, 1991	Atlantic Ocean- Cape Hatteras	216	468/- (M)
Jun 4, 1991	Aug 10, 1999	Chesapeake Bay- Thomas Pt. Light	2,988	362/- (M)
Apr 21, 1992	Oct 18, 1996	Lynnhaven Inlet, VA	1,640	499/660 (F)
May 11, 1993	May 26, 1996	Barnegat Bay, NJ	1,110	500/- (F)
May 2, 1995	May 1, 1996	Harwich, MA	364	410/- (F)
May 2, 1995	Nov 20, 2000	Chesapeake Bay Bridge, MD	2,027	551/- (M)
Apr 29, 1996	Jul 1, 1998	Piscataquog River, ME	813	547/584 (M)
May 6, 1996	Aug 10, 1999	Chesapeake Bay- Thomas Pt. Light	1,191	-/-
Apr 14, 1997	Nov 27, 1998	Chesapeake Bay	589	437/- (M)
Apr 14, 1997	Jun 21, 2006	Little Egg Inlet, NJ	3,353	965/1,118 (F)
Apr 17, 1997	Aug 14, 1997	Earl, NJ	119	583/- (M)
Apr 28, 1997	Mar 7, 1998	Elizabeth River, VA	313	433/- (M)
May 12, 1997	Jun 26, 1998	Kennebec River, ME	410	573/610 (F)
May 12, 1997	Aug 10, 1999	Chesapeake Bay- Thomas Pt. Light	820	578/- (F)
May 12, 1997	Jun 5, 2002	Block Island	1,849	686/- (F)
Apr 27, 1998	Jun 8, 1998	Harrison's Pier, Chesapeake Bay, VA	42	574/- (F)
May 4, 1998	May 23, 1999	Lynnhaven Bridge, VA	384	410/451 (M)
May 11, 1998	Jul 14, 2002	East of Chatham, MA	1,524	559/838 (M)
Apr 26, 1999	Aug 10, 1999	Atlantic Ocean- Duck	106	542/610 (M)
Apr 24, 2000	Jul 23, 2000	Atlantic Ocean- Block Island, RI	90	719/762 (M)
Apr 23, 2001	Sep 10, 2001	Long Island, NY	140	858/858 (F)
Apr 23, 2001	May 14, 2002	Merrimack River, MA	386	686/813 (M)
Apr 23, 2001	Oct 11, 2003	Brigantine Bay, NJ	901	1001/- (F)
May 7, 2001	Sep 19, 2001	Martha's Vineyard, MA	135	855/- (F)
May 14, 2001	May 17, 2002	Atlantic Ocean - Boston	368	721/787 (M)
May 6, 2002	Jun 12, 2002	Atlantic Ocean - Nags Head	44	730/724 (M)
May 6, 2002	Jul 8, 2002	Cape Cod Bay	63	933/- (F)
Apr 28, 2003	Dec 8, 2005	Atlantic Ocean - Corolla	954	933/838 (F)
May 5, 2003	Oct 29, 2003	Elizabeth River, VA	177	536/- (M)
Table 17.				

Continued				
Date released	**Recapture date**	**Recapture location**	**No. days at large**	**Release/Recapture length (mm, TL)**
May 5, 2003	Jun 30, 2004	Long Island Sound	421	927/965 (F)
May 12, 2003	Jul 6, 2003	Buzzards Bay, MA	55	991/- (F)
May 19, 2003	Jun 26, 2003	Monmouth Beach, NJ	38	927/978 (F)
May 19, 2003	Jul 9, 2003	Moriches Inlet, NY	51	889/889 (F)
May 19, 2003	Nov 10, 2003	Chesapeake Bay	175	564/- (F)
May 4, 2004	Jun 27, 2004	Martha's Vineyard, MA	54	927/940 (F)
May 4, 2004	Jul 5, 2004	Atlantic Ocean - Nags Head	62	888/864 (F)
May 4, 2004	Nov 28, 2004	Chesapeake Bay	208	844/- (F)
May 4, 2004	Sep 7, 2005	Martha's Vineyard	491	908/940 (F)
May 4, 2004	Aug 28, 2005	Block Island, RI	481	940/914 (F)
May 4, 2004	Aug 2, 2008	Old Saybrook, CT	1,550	953/1,067 (F)
May 10, 2004	Sep 26, 2004	Atlantic Ocean - Nags Head	139	539/- (M)
Apr 25, 2005	Jun 10, 2005	Long Island, NY	46	908/- (F)
Apr 25, 2005	Mar 1, 2008	Rudee Inlet, VA	1,040	1,054/ - (F)
May 2, 2005	Jun 11, 2005	Montauk Point, NY	40	991/- (F)
May 2, 2005	Aug 22, 2005	8 mi. East of Nantucket, MA	112	975/991 (F)
May 2, 2005	Oct 2, 2005	Nags Head Fishing Pier	153	413/- (M)
May 2, 2005	May 22, 2006	Raritan Bay, NJ	385	876/838 (F)
May 2, 2005	Oct 12, 2006	Bartletts Reef, Long Is	528	984/- (F)
May 9, 2005	Jun 15, 2005	Monmouth Beach, NJ	37	911/- (F)
May 16, 2005	Jun 6, 2005	Atlantic Ocean - Nags Head	21	603/- (F)
May 16, 2005	Jul 11, 2005	Little Gull Island, NY	56	972/- (F)
May 16, 2005	Dec 12, 2005	Atlantic Ocean - Corolla	210	470/- (F)
May 16, 2005	Jun 15, 2005	Atlantic Ocean - Nags Head	30	514/- (M)
Apr 17, 2006	Jun 21, 2006	Sandy Hook, NJ	65	1,030/1,067 (F)
Apr 17, 2006	Jul 24, 2006	Montauk Point, NY	98	1,002/991 (F)
Apr 24, 2006	Jun 5, 2006	Long Island, NY	42	1,000/- (F)
Apr 24, 2006	Jun 25, 2006	Deal Beach, NJ	62	978/1,016 (F)
Apr 24, 2006	Sep 12, 2006	Martha's Vineyard, MA	141	957/800 (F)
Apr 24, 2006	Aug 23, 2006	Buzzards Bay, MA	121	921/914 (F)
Apr 24, 2006	Jan 14, 2007	Chesapeake Bay Bridge Tunnel	265	940/914 (F)
Apr 24, 2006	Jul 26, 2007	Martha's Vineyard	458	1,022/1,067 (F)
Apr 24, 2006	Jan 7, 2008	Atlantic Ocean off Cape Charles, VA	622	838/914 (M)
May 1, 2006	Jun 13, 2006	Block Island, RI	43	890/914 (F)
May 1, 2006	Jul 7, 2006	Little Compton, RI	67	962/914 (F)
May 1, 2006	Nov 10, 2006	Chesapeake Bay-Cranneyhack	193	1,041/1,067 (F)
Table 17 -				

Continued				
Date released	**Recapture date**	**Recapture location**	**Number of days at large**	**Release/ Recapture length (mm, TL)**
May 1, 2006	Jun 7, 2007	Seabright, NJ	402	1,022/1,092 (F)
May 1, 2006	Sep 22, 2007	Montauk Point, NY	509	1,105/- (F)
May 8, 2006	Jul 19, 2006	Block Island, RI	72	945/787 (F)
May 8, 2006	Jun 15, 2006	Long Branch, NJ	38	992/991 (F)
May 8, 2006	Aug 17, 2006	Martha's Vineyard	101	971/1,194 (F)
May 8, 2006	Jun 8, 2008	Lavallette, NJ	761	965/1,003 (F)
May 8, 2006	Dec 13, 2006	Chesapeake Bay Bridge Tunnel	219	927/939 (F)
May 8, 2006	May 17, 2007	Raritan Bay, NY	374	965/914 (F)
May 8, 2006	Sep 10, 2007	Block Island, RI	490	940/ - (F)
Apr 23, 2007	Jul 19, 2009	Block Island, RI	817	1,003/1,092 (F)
Apr 30, 2007	Jul 26, 2007	Block Island, RI	87	1,067/- (F)
May 7, 2007	Jul 15, 2007	Provincetown, MA	69	914/- (M)
May 7, 2007	Jul 15, 2007	Nantucket, MA	69	972/- (F)
May 7, 2007	Aug 1, 2007	Cape Cod Canal	86	883/889 (F)
May 7, 2007	Dec 8, 2007	Chesapeake Bay, Virginia Beach, VA	215	978/991 (F)
May 7, 2007	Dec 9, 2007	Rappahannock River	216	946/991 (F)
May 7, 2007	Jan 27, 2008	Atlantic Ocean off Kitty Hawk	265	1,111/1,143 (F)
May 7, 2007	Jun 3, 2008	Long Island Sound, NY	392	961/1,029 (F)
May 7, 2007	Jun 7, 2008	Block Island, RI	396	996/1,118 (F)
May 14, 2007	Aug 11, 2007	Montauk, NY	89	1,022/927 (F)
May 21, 2007	Apr 18, 2008	Chesapeake Bay Entrance	332	572/584 (F)
Apr 14, 2008	Jun 5, 2008	Cape Cod, MA	52	-/1,187
Apr 21, 2008	May 26, 2008	Mantuloking, NJ	35	968/965 (F)
Apr 21, 2008	Jun 15, 2008	Asbury Park, NJ	55	1,022/1,092 (F)
Apr 21, 2008	Aug 21, 2008	Back Bay, VA	122	470/470 (M)
Apr 28, 2008	Jun 17, 2008	Shark River Inlet, NJ	50	1,105/1,041 (F)
Apr 28, 2008	Aug 12, 2008	Sand Beach, NY	106	1,054/1,092 (F)
Apr 28, 2008	Aug 9, 2008	Point Judith, RI	103	946/953 (F)
May 5, 2008	Jun 9, 2008	Block Island, RI	35	889/889/ (M)
May 5, 2008	Sep 10, 2008	Providencetown, MA	128	914/927 (F)
Apr 28, 2008	Sep 9, 2008	Cape Cod Bay, MA	134	940/940 (F)
Apr 21, 2008	Aug 21, 2008	Back Bay, VA	122	470/- (M)
Apr 28, 2008	Sep 1, 2008	Back Bay, VA	126	508/571 (F)
Apr 14, 2008	Oct 4, 2008	Jones Inlet, NY	173	1,054/1,168 (F)
Apr 28, 2008	Nov 5, 2008	Barnegatt Inlet, NJ	191	895/914 (F)
May 12, 2008	Jun 17, 2008	Seabridge, NJ	36	991/991 (F)
Apr 21, 2008	Nov 17, 2008	Solomons Island, MD	210	1,060/1,143 (F)
Apr 21, 2008	Nov 12, 2008	Mouth Potomac River	205	1,003/1,016 (F)
Apr 14, 2008	Jun 1, 2009	Jamaica Bay, NY	413	1,086/1,118 (F)
Apr 21, 2008	Nov 29, 2009	Monitor Merrimac Tunnel, VA	587	1,060/1,143 (F)

Table 17 - Continued				
Date released	**Recapture date**	**Recapture location**	**Number of days at large**	**Release/ Recapture length (mm, TL)**
May 12, 2008	Aug 3, 2009	Montauk, NY	448	1,099/1,130 (F)
Apr 28, 2008	Aug 12, 2009	Providencetown, MA	471	775/813 (M)
May 5, 2008	Jul 18, 2009	Saybrook, CT	439	889/914 (M)
May 12, 2008	Sep 3, 2009	Nantucket Sound, MA	479	857/902 (F)
May 12, 2008	Nov 8, 2009	Delware Bay, NJ	545	984/1,041 (F)
Apr 27, 2009	Oct 5, 2009	Back Bay, VA	161	482/ - (F)
Apr 27, 2009	Nov 20, 2009	Back Bay, VA	207	438/457 (M)
May 4, 2009	May 22, 2009	Island Beach Park, NJ	18	1,042/1,092 (F)
May 4, 2009	Jul 15, 2009	Martha's Vineyard	72	1,011/1,143 (F)
May 4, 2009	Jun 24, 2009	Monomoy Island, MA	51	927/614 (F)
May 4, 2009	Sep 2, 2009	Cape Cod Canal, MA	121	800/851 (F)

Table 18. Roanoke River spawning stock tag returns from outside the Albemarle Sound Management area.

Date released	Recapture date	Recapture location	Number of days at large	Release/recapture length (mm, TL)
Apr 21, 1992	1995	Pungo River	~1,095	-/-
May 18, 1992	1995	Pungo River	~1,095	-/-
Apr 21, 1992	1995	Pungo River	~1,095	-/-
May 18, 1992	Nov 3, 1996	Pamlico Sound- Hatteras	1,627	434/- (M)
Apr 21, 1992	Nov 11, 1995	Back Bay, VA	1,299	439/- (M)
May 11, 1993	Nov 16, 1997	Neuse River- Simmons Bay	1,649	489/648 (F)
May 18, 1993	Jun 16, 1997	Meherrin River- Courtland, VA	1,489	474/533 (M)
Apr 17, 1995	Mar 1996	Pamlico Sound- Long Shoal River	~318	537/- (M)
May 2, 1995	Jul 3, 1997	Pungo River	792	406/533 (M)
May 25, 1995	Apr 10, 1997	Nottoway River, VA	685	419/489 (M)
May 13, 1996	Sep 1, 1997	Stumpy Point Bay	476	524/- (M)
May 28, 1996	Jun 1, 1999	Pungo River- Slade Creek	1,099	420/597 (M)
May 5, 1997	Oct 8, 1997	Pungo River	156	484/484 (M)
Apr 17, 1997	Jun 23, 1997	Pamlico Sound- Olivers Reef	67	389/- (M)
Apr 17, 1997	Sep 23, 1997	Neuse River- New Bern	159	490/- (M)

Table 18	Continued			
Date released	**Recapture date**	**Recapture location**	**Number of days at large**	**Release/recapture length (mm, TL)**
Apr 28, 1997	Jun 22, 1997	Pungo River- Scranton Creek	55	455/- (M)
Apr 28, 1997	Oct 14, 1998	Stumpy Point Bay	169	464/- (M)
Apr 28, 1997	Mar 9, 1999	Pamlico River	680	440/- (M)
Apr 28, 1997	Apr 22, 1999	Nottoway River, VA	724	418/- (M)
May 5, 1997	Dec 20, 1997	Pungo River- Belhaven	229	592/610 (F)
May 5, 1997	Jul 12, 1997	Pamlico Sound- Synden Point	68	516/- (M)
May 12, 1997	Aug 2, 1997	Pantego Creek	82	484/484 (M)
May 27, 1997	Apr 23, 2001	Nottoway River, VA	1,426	508/610 (M)
Apr 27, 1998	Jan 4, 2000	Pamlico River- Bath	616	433/463 (M)
Apr 27, 1998	Aug 10, 1998	Pamlico Sound- Gibbs Shoal	105	438/- (M)
May 11, 1998	Aug 1, 1998	Long Shoal River	82	523/- (M)
May 4, 1998	Jun 28, 1998	Pungo River	55	558/559 (M)
May 4, 1998	Jul 16, 1998	Pungo River	73	614/- (F)
May 4, 1998	Jul 6, 1998	Pungo River- Belhaven	63	630/- (F)
May 4, 1998	Aug 3, 2002	Neuse River- New Bern	1,551	521/679 (F)
May 11, 1998	Apr 25, 1999	Nottoway River, VA	349	565/572 (F)
May 11, 1998	Apr 22, 1999	Blackwater River, VA	346	458/495 (M)
May 11, 1998	Mar 20, 1999	Pungo River- Leechville	313	494/508 (F)
May 24, 1999	Jul 16, 1999	Pungo River	53	480/- (M)
May 3, 1999	Aug 3, 1999	Pungo River- Belhaven	92	552/- (M)
May 3, 1999	Jun 18, 1999	Pamlico Sound	46	458/483 (M)
May 3, 1999	Mar 5, 2000	Pamlico River- Bath Creek	306	489/533 (M)
May 24, 1999	Jan 9, 2000	North Landing River, VA	230	435/- (M)
May 10, 1999	Oct 28, 1999	Pungo River- Dowery Creek	171	571/597 (M)
May 1, 2000	Jul 23, 2000	Pungo River- Belhaven	83	567/- (M)

Table 18.	Continued			
Date released	**Recapture date**	**Recapture location**	**Number of days at large**	**Release/recapture length (mm, TL)**
May 22, 2000	Jun 21, 2000	Pamlico River- Broad Creek	30	515/- (M)
Apr 24, 2000	Oct 15, 2000	Neuse River- New Bern	174	489/521 (M)
May 8, 2000	Oct 21, 2000	Pungo River- Belhaven	166	463/508 (M)
May 1, 2000	Nov 28, 2000	Stumpy Point Bay	211	458/483 (M)
Apr 17, 2000	Jan 1, 2001	Pungo River- Belhaven	259	517/- (M)
Apr 17, 2000	Dec 29, 2000	Pungo River- Leechville	256	417/559 (M)
Apr 17, 2000	Oct 27, 2001	Pantego Creek	558	464/597 (M)
Apr 17, 2000	May 25, 2002	Pungo River	768	432/559 (M)
May 15, 2000	Mar 15, 2002	Pungo River- Belhaven	304	457/- (M)
Apr 24, 2000	Apr 21, 2001	Nottoway River, VA	362	495/565 (M)
May 1, 2000	Sep 1, 2001	Pungo River	488	601/610 (F)
May 1, 2000	Mar 5, 2002	Upper Pamlico River	673	491/668 (M)
Apr 17, 2001	Jun 20, 2001	Pungo River- Belhaven	64	533/533 (M)
Apr 30, 2001	Aug 4, 2001	Swan Quarter Narrows	96	495/533 (F)
Apr 30, 2001	Feb 13, 2002	Pungo River- Belhaven	289	514/- (M)
May 14, 2001	Jul 11, 2001	Hobucken- ICW	58	533/546 (M)
May 14, 2001	Dec 11, 2001	Pungo River	211	540/- (F)
May 21, 2001	Aug 22, 2001	Pantego Creek- Belhaven	93	502/- (M)
May 29, 2001	Mar 13, 2002	Pungo River- Belhaven	288	528/- (M)
May 7, 2001	May 25, 2002	Pungo River- Belhaven	383	559/597 (M)
Apr 30, 2001	Apr 11, 2002	Scranton Creek	346	495/587 (M)
Apr 23, 2001	Oct 6, 2002	Pungo River- Belhaven	531	565/635 (M)
Apr 23, 2001	Oct 22, 2002	Pungo River- Belhaven	547	571/635 (F)
Apr 23, 2001	Mar 27, 2003	Pamlico River	703	489/- (M)
Apr 23, 2001	Oct 4, 2003	Pungo River- Belhaven	894	514/597 (M)

Table 18.	Continued			
Date released	**Recapture date**	**Recapture location**	**Number of days at large**	**Release/recapture length (mm, TL)**
May 6, 2002	Jul 7, 2002	Pungo River	62	559/546 (M)
May 13, 2002	Jun 30, 2002	Pantego Creek	48	598/508 (F)
Apr 22, 2002	Mar 9, 2003	Pamlico River- Maul Point	321	737/749 (M)
May 6, 2002	Aug 12, 2003	Pamlico Sound	463	470/- (M)
May 5, 2003	Jun 19, 2003	Pantego Creek	45	432/- (M)
May 5, 2003	Jun 22, 2003	Neuse River- New Bern	48	662/- (M)
May 19, 2003	Jul 3, 2003	Pungo River	45	584/- (M)
May 12, 2003	Aug 22, 2003	Pungo River	102	438/- (M)
May 27, 2003	Sep 2, 2003	Pamlico Sound	98	584/- (F)
Jun 3, 2003	Aug 10, 2003	Pamlico River- Mouth	68	552/- (M)
May 12, 2003	Nov 1, 2003	Pungo River	173	395/- (M)
May 12, 2003	Mar 12, 2004	Pamlico River- Mouth	304	635/686 (F)
May 19, 2003	May 22, 2004	Pamlico River- Pamlico Beach	368	584/622 (M)
Jun 3, 2003	Jun 10, 2004	Pungo River	372	622/- (M)
May 5, 2003	Sep 23, 2004	Pamlico River- Ragged Point	506	521/572 (M)
May 5, 2003	Dec 18, 2004	Pamlico River- Marker #3	592	451/584 (M)
May 27, 2003	Dec 7, 2004	Pungo River- Sandy Point	559	330/483 (M)
Jun 3, 2003	May 27, 2006	Nottoway River, VA	1,088	502/- (M)
May 2, 2005	Jul 4, 2005	Pungo River- Belhaven	63	540/- (F)
May 2, 2005	Aug 5, 2005	Pungo River- Belhaven	95	552/- (F)
May 9, 2005	Jul 13, 2005	Pungo River- Leechville	65	463/- (F)
May 9, 2005	Nov 25, 2005	Pungo River- Jordan Creek	200	686/- (F)
May 2, 2005	Jan 25, 2007	Tar River- Grimesland	633	489/- (F)
May 2, 2005	Mar 21, 2008	Neuse River – Slocum Creek	1,053	451/495 (M)
May 23, 2005	May 2, 2009	Neuse River – near Goldsboro	1,439	572/- (F)
Apr 10, 2006	Jul 29, 2006	Pantego Creek	110	576/584 (F)

Table 18.	Continued			
Date released	**Recapture date**	**Recapture location**	**Number of days at large**	**Release/recapture length (mm, TL)**
Apr 10, 2006	Jul 15, 2006	Pungo River- Belhaven	96	489/483 (M)
Apr 17, 2006	Jun 30, 2006	Scranton Creek	74	546/533 (M)
Apr 24, 2006	Jul 29, 2006	Pantego Creek	96	602/546 (F)
Apr 24, 2006	Jul 20, 2006	Pantego Creek	87	615/597 (M)
Apr 24, 2006	Sep 14, 2006	Pungo River- Belhaven	141	933/660 (F)
Apr 24, 2006	Aug 15, 2007	Pungo River – Belhaven	478	464/ - (M)
May 1, 2006	Feb 18, 2009	Tar River – Greenville	983	495/- (M)
May 8, 2006	Jun 10, 2006	Pungo River- Belhaven	33	591/584 (F)
May 15, 2006	Jun 23, 2006	Pungo River- Belhaven	39	596/603 (M)
Apr 17, 2006	Oct 7, 2006	Pungo River- Belhaven	173	584/584 (M)
May 15, 2006	Nov 3, 2006	Pungo River- Belhaven	172	489/508 (M)
May 15, 2006	Oct 21, 2006	Pamlico Sound- Berry's Bay	159	578/- (M)
Apr 16, 2007	Jun 16, 2007	Pungo Creek	61	533/533 (M)
May 21, 2007	Jul 19, 2007	Pungo River- Leechville	59	737/711 (F)
May 7, 2007	Jul 10, 2007	Pungo River- Leechville	64	611/- (M)
May 7, 2007	Aug 17, 2007	Pungo River- Leechville	102	464/- (M)
May 7, 2007	Jun 7, 2007	Pungo River- Belhaven	31	476/- (M)
Apr 30, 2007	Jul 23, 2007	Pamlico Sound- Juniper Bay	84	533/- (M)
Apr 16, 2007	Jul 8, 2007	Pungo River	83	737/- (M)
May 27, 2008	Jul 6, 2008	Pungo River – Belhaven	40	546/ - (F)
Apr 21, 2008	Dec 2, 2008	Pungo River- Belhaven	225	470/622 (M)
Apr 14, 2008	Mar 12, 2009	Pungo River – Dowery Creek	332	438/495 (M)
May 12, 2008	Mar 23, 2009	Pantego Creek	315	368/444 (M)
May 5, 2008	Mar 15, 2009	Pungo River	314	438/470 (M)
May 5, 2008	Nov 30, 2009	Pungo River – Belhaven	574	425/508 (M)

Table 18.	Continued			
Date released	**Recapture date**	**Recapture location**	**Number of days at large**	**Release/recapture length (mm, TL)**
Apr 13, 2009	Nov 18, 2009	New River	219	533/635 (M)
Apr 21, 2009	Jun 8, 2009	Pamlico R – Bath Creek	48	519/- (M)
May 4, 2009	Dec 11, 2009	Pamlico Sound – Berry Bay	221	825/860 (M)
May 11, 2009	Sep 17, 2009	Pungo Creek	129	495/470 (M)

Table 19. Roanoke River spawning stock tag returns for the Oregon Inlet area.

Date released	Recapture date	Number of days at large	Release/recapture length (mm, TL)
May 26, 1992	Nov 25, 1997	2,008	422/660 (M)
May 18, 1993	Dec 28, 1997	1,684	488/559 (M)
May 15, 1995	Dec 3, 1997	932	545/- (M)
Apr 17, 1995	Nov 21, 1999	1,678	348/559 (M)
Apr 29, 1996	Aug 15, 1996	108	452/610 (M)
May 6, 1996	Nov 26, 1999	1,299	794/991 (F)
May 6, 1996	Oct 12, 1997	524	485/- (M)
Apr 21, 1997	Jun 25, 1997	65	554/- (M)
May 5, 1997	Nov 26, 1997	204	519/- (M)
May 12, 1997	Oct 5, 1997	146	469/508 (M)
May 12, 1997	Nov 25, 1997	198	575/575 (F)
Apr 21, 1997	Dec 7, 1997	230	654/- (F)
May 27, 1997	Dec 21, 1997	208	491/508 (M)
May 19, 1997	Dec 2, 1998	562	685/838 (F)
May 19, 1997	Dec 3, 1998	563	610/737 (F)
May 5, 1997	Sep 15, 2000	1,228	497/- (F)
May 11, 1998	Jun 5, 1998	25	539/- (M)
May 11, 1998	Jun 10, 1998	30	609/- (M)
May 26, 1998	Aug 15, 1998	81	435/- (M)
May 4, 1998	Sep 4, 1998	122	492/- (M)
May 11, 1998	Dec 27, 1998	230	-
Apr 20, 1998	Dec 21, 1998	245	587/- (M)
May 4, 1998	Nov 11, 1999	556	553/648 (F)
May 26, 1998	Oct 24, 1998	151	735/737 (F)
May 4, 1998	Apr 3, 1999	335	457/508 (M)
May 11, 1998	Feb 10, 1999	275	485/508 (M)
Apr 27, 1998	Nov 8, 1999	560	597/635 (M)
May 11, 1998	Dec 18, 1999	586	560/648 (M)
May 11, 1998	Mar 3, 2000	661	520/559 (M)
Apr 27, 1998	Jun 24, 2000	788	403/533 (M)
Apr 20, 1998	Nov 9, 2001	1,298	438/483 (M)
Apr 27, 1998	Nov 11, 2001	1,293	427/568 (M)

Table 19. Continued			
Date released	**Recapture date**	**Number of days at large**	**Release/recapture length (mm, TL)**
May 11, 1998	Dec 4, 2001	1,302	641/914 (M)
May 3, 1999	Jun 12, 1999	40	608/610 (F)
May 17, 1999	Jun 10, 1999	24	731/737 (F)
May 3, 1999	Jul 1, 1999	59	597/- (M)
Apr 19, 1999	Nov 20, 1999	215	635/635 (M)
May 3, 1999	Jun 23, 2000	416	510/749 (M)
May 3, 1999	Sep 15, 2002	1,230	571/711 (M)
May 10, 1999	Jul 8, 2000	428	491/686 (M)
May 17, 1999	Dec 4, 1999	201	621/660 (F)
May 1, 2000	Jun 8, 2000	60	620/660 (M)
May 8, 2000	Aug 2, 2002	816	578/660 (M)
May 15, 2000	Jun 6, 2000	22	613/660 (M)
May 15, 2000	Jun 8, 2000	24	533/584 (M)
Apr 24, 2000	Sep 27, 2000	156	529/584 (F)
Apr 24, 2000	Sep 7, 2000	136	498/- (M)
Apr 24, 2000	Oct 8, 2000	167	519/- (F)
Apr 24, 2000	Oct 27, 2000	186	477/- (M)
Apr 24, 2000	Sep 24, 2001	518	743/787 (F)
Apr 24, 2000	Nov 22, 2004	1,672	508/749 (M)
May 30, 2000	Nov 4, 2000	158	683/711 (M)
May 22, 2000	Oct 30, 2000	161	739/762 (F)
Apr 23, 2001	May 29, 2001	36	686/699 (M)
Apr 23, 2001	Aug 13, 2001	112	762/813 (F)
May 7, 2001	Jul 26, 2001	80	660/705 (F)
May 21, 2001	Jun 17, 2001	27	651/660 (M)
Apr 30, 2001	Nov 11, 2001	195	660/686 (F)
Apr 30, 2001	Nov 9, 2001	193	654/660 (M)
May 7, 2001	Oct 17, 2001	163	660/711 (F)
May 29, 2001	Oct 19, 2001	143	705/711 (F)
May 29, 2001	Jun 10, 2002	377	444/686 (M)
Apr 30, 2001	Jun 17, 2002	413	489/- (M)
Apr 15, 2002	Jun 25, 2002	71	740/724 (M)
Apr 22, 2002	May 26, 2002	34	805/864 (M)
Apr 22, 2002	Aug 5, 2002	105	884/- (F)
Apr 22, 2002	Aug 12, 2002	112	667/- (M)
Apr 22, 2002	Jul 10, 2002	79	657/- (M)
Apr 22, 2002	Jan 8, 2003	230	737/- (M)
Apr 29, 2002	Jun 26, 2002	58	708/762 (M)
May 6, 2002	Jun 15, 2002	40	1,003/1,022 (F)
May 6, 2002	Aug 25, 2002	111	753/749 (M)
Apr 29, 2002	Oct 20, 2002	174	713/730 (M)
May 19, 2003	Jun 10, 2003	22	914/889 (F)
May 19, 2003	Jul 18, 2003	20	533/533 (M)

Table 19. Continued			
Date released	**Recapture date**	**Number of days at large**	**Release/recapture length (mm, TL)**
May 5, 2003	Jun 11, 2003	37	762/- (F)
Jun 3, 2003	Sep 14, 2003	103	483/- (M)
May 27, 2003	Sep 5, 2003	101	603/- (M)
May 27, 2003	Oct 15, 2003	141	698/- (F)
May 27, 2003	Jun 2, 2004	371	533/- (F)
May 4, 2004	Jun 15, 2004	42	809/813 (M)
May 4, 2004	Oct 26, 2004	175	730/- (F)
May 10, 2004	Oct 25, 2005	533	483/660 (M)
May 2, 2005	Jun 12, 2005	41	559/- (F)
May 9, 2005	Jun 8, 2005	30	533/- (F)
May 9, 2005	Aug 20, 2005	103	489/- (F)
Apr 25, 2005	Oct 13, 2005	171	584/- (F)
Apr 25, 2005	Aug 3, 2005	100	514/- (M)
May 9, 2005	Oct 14, 2005	158	533/- (M)
May 16, 2005	Sep 25, 2005	132	601/- (F)
May 23, 2005	Nov 24, 2005	185	914/- (F)
Apr 24, 2006	May 10, 2006	16	844/851 (F)
May 8, 2006	Jun 18, 2006	41	512/495 (M)
Apr 10, 2006	Jul 12, 2006	93	809/813 (M)
May 15, 2006	Jun 26, 2006	42	798/787 (F)
May 15, 2006	Jul 4, 2006	50	767/787 (M)
May 1, 2006	Aug 5, 2006	96	758/775 (M)
May 15, 2006	Jul 26, 2006	72	798/787 (M)
May 8, 2006	Oct 2, 2006	147	679/762 (M)
Apr 17, 2006	Dec 31, 2006	258	533/584 (M)
May 8, 2006	Dec 23, 2006	229	908/990 (F)
May 15, 2006	Jan 10, 2007	240	813/838 (F)
Apr 17, 2006	May 14, 2007	392	457/457 (M)
May 15, 2006	Jun 9, 2007	390	711/749 (M)
May 15, 2006	Nov 6, 2007	540	660/749 (M)
May 14, 2007	Jun 6, 2007	23	660/647 (M)
May 14, 2007	Jun 10, 2007	27	948/914 (F)
May 21, 2007	Jun 17, 2007	27	749/- (F)
Apr 30, 2007	Mar 31, 2008	334	673/698 (M)
May 7, 2007	Dec 21, 2007	228	673/711 (F)
May 7, 2007	Mar 1, 2008	298	489/- (M)
May 14, 2007	Feb 11, 2008	272	521/- (M)
May 14, 2007	Jan 18, 2008	248	737/711 (M)
May 11, 2009	Oct 20, 2009	162	464/571 (M)

A total of 133 tags (10.5%) have been returned and the returns by year are presented in Table 16. No returns have occurred since 2000. Returns from the spawning grounds on Roanoke River accounted for 37 of the total tags returned. All of the remaining tags were from the ASMA, except for five. One tag was recaptured in March 1996, from Pamlico Sound off the mouth of Long Shoal River (Table 18). In May 1996, a tagged fish was recaptured in Harwich, MA by hook-and-line. During 1997, two tags were returned from outside the ASMA. In April 1997, a tag was returned from Nottoway River, VA, below Highway 671 Bridge and one from the Pungo River, NC in July. A tagged fish was recaptured at the Chesapeake Bay Bridge, MD on November 18, 2000 (Table 17). Hook-and-line has accounted for 97 of the returns; pound nets 18 returns and gill nets 10.

Spring 1996

Tagging efforts during the spring spawning run were concentrated from near Weldon to Roanoke Rapids, NC. A cooperative effort with NCWRC resulted in the capture and release of 1,415 striped bass of which 1,378 were released with NCDMF internal anchor tags. There were 1,238 male striped bass and 177 females.

Since release, 128 tags have been returned (Table 16), with 53 of these returns from the Roanoke River, near Weldon. Ninety-seven percent of the returns have been from the ASMA. During September 1997, a tag was returned from Stumpy Point Bay, NC (Table 18). A tagged fish was recaptured in the Piscataquog River, ME in July 1998. In June 1999, a tagged striped bass was recaptured in the Chesapeake Bay, at Thomas Point Light in August 1999 (Table 17). Hook-and-line has accounted for 86% of the recaptures, followed by gill nets (9.6%).

Spring 1997

During the spring 1997, tagging efforts on the spawning grounds in Roanoke River resulted in 2,167 striped bass being tagged and released (Table 16). A total of 288 tags have been returned. Seventy-two of the returns were from the spawning grounds within 20 – 30 days of release. During 1998 – 2001, 42 tags were returned from the spawning grounds. A total of 11 tags have been returned from areas outside the ASMA (Table 18). The area around Oregon Inlet has accounted for 9 returns (Table 19). Seven tags were returned from outside of North Carolina's waters (Table 17), with one of the returns from Kennebec River Dam, ME. This fish was at large 410 days and recaptured ~ 766 miles from the release site. Hook-and-line has accounted for 92% of the returns followed by gill nets (n=8) and pound nets (n=6).

Spring 1998

Tagging efforts during the spawning run were concentrated from the Weldon area to Roanoke Rapids, NC (Figure 3). The cooperative effort between NCWRC and NCDMF resulted in the capture of 3,375 striped bass, of which, 2,060 were tagged and released. A total of 243 (11.8%) have been returned thus far (Table 16). Thirty-seven of the returns were from the spawning grounds within 30 days of release. Three tags have been returned from outside North Carolina waters (Table 17). On June 8, 1998, a tagged fish was recaptured near the mouth of the Chesapeake Bay at Harrison's Pier. During May 1999, a tagged fish was recaptured at the Lynnhaven Bridge, VA. In May 2002, a tagged striped bass (male) was captured east of Chatham, MA; at release the fish was 559 mm TL and 838 mm TL at recapture. Ten returns from outside the ASMA have occurred in State waters (Table18).

Seventeen tags have been returned from the Oregon Inlet area (Table 19). Hook-and-line has accounted for over 88% of the returns.

Spring 1999

A total of 2,177 striped bass was tagged and released on the spawning grounds from mid-April through early June. Since the spring of 1999, 217 tags have been returned (Table 16). Fifty-two (24.4%) of the returns were from the spawning grounds within 2-25 days from release. Only one tag return has occurred from outside internal State waters (August 1999- Atlantic Ocean – off Duck) (Table 17). Table 18 shows the returns that have occurred from areas south of the ASMA. A total of 9 tags have been returned from the Oregon Inlet area (Table 19). Over 82% of the returns have been from hook-and-line gear, followed by gill nets and pound nets.

Spring 2000

Tagging efforts during the 2000 spawning run on the upper Roanoke River were concentrated from near Halifax to Roanoke Rapids area. A total of 1,970 fish was tagged and released and 194 (9.8%) tags have been returned (Table 16). Forty-one (21%) of the returns were from the spawning grounds with in a couple of weeks of release. One tag was returned from off Block Island, RI on July 23, 2000, being at large 90 days (Table 17). Thirteen returns have occurred from areas south of ASMA, with 10 of these from the Pungo/Pamlico rivers areas (Table 18). The returns from the Oregon Inlet area are shown in Table 19. Hook-and-line recaptures have accounted for 86.5% of the returns.

Spring 2001

The number of striped bass tagged and released on the spawning grounds, Roanoke River, NC during the spring 2001 are shown in Table 16 and the returns by year. Three hundred and twenty-three tags (12.2%) have been returned from the 2,647 tagged and released. Thirty-three of the returns were from the spawning grounds within 30 days of release. Five tag returns have been received from areas outside North Carolina (Table 17). Returns from areas south of the ASMA totaled 13 and are shown in Table 18. The majority of these returns (n=12) have been from the Pamlico and Pungo river areas. The Oregon Inlet area has accounted for 10 of the returns (Table 19). Approximately 82% of the returns were from hook-and-line, followed by pound nets (n=44) and gill nets (n=5).

Spring 2002

A total of 2,032 striped bass were captured, tagged and released on the spawning grounds from mid-April through early June 2002 (Figure 3). Since that time, 180 tags have been returned (Table 16) and 21% of these returns occurred from the Weldon area with in 20 days of release. Two tags have been returned from outside the internal waters (Jun 2002- Atlantic Ocean- off Nags Head; Jul 2002- Cape Cod Bay) (Table 17). Returns from outside the ASMA have totaled four, all from Pamlico- Pungo river areas (Table 18). Table 19 shows the returns from the Oregon Inlet area, which have totaled ten. Hook-and-line dominated the recapture gear accounting for 70.6% of the returns, followed by pound nets (17.8%) and gill nets (3.9%).

Spring 2003

Through cooperative efforts of the NCWRC and NCDMF, 3,146 striped bass were tagged and released in the Roanoke River, on the spawning grounds during the spring 2003 (Table 16). The number of returns by year is shown in Table 16, with a total of 336 tags

being returned (10.7%). Fifty-three of the returns in 2004 were from the Roanoke River during the spring, 31 returns in 2005, 13 returns in 2006, 5 returns in 2007 and 1 return in 2009. Seven tags have been returned from outside NC internal waters (Table 17). Fourteen tags have been returned from areas south of the ASMA (Table 18), with Pamlico and Pungo river areas accounting for the majority of the returns (84.6%). There were seven returns from the Oregon Inlet area (Table 19).

Spring 2004

During mid-April through early June 2004, NCWRC and NCDMF collected, tagged and released 1,530 striped bass and 150 tags have been returned to date (Table 16). The returns from outside of North Carolina, which totaled seven, are shown in Table 17. There have been no returns from areas south of the ASMA. Only three returns have occurred in the Oregon Inlet area and are shown in Table 19. Hook-and-line has accounted for the 80.1% of the returns.

Spring 2005

A total of 4,104 striped bass was tagged and released in Roanoke River, near Weldon and 387 tags returned to date (Table 16). Forty-nine (17%) of the tag returns in 2005 were from the Weldon area, within 20 days of release. In 2006, 90 returns were from the Roanoke River area during the spring. During 2007, 38 tag returns were received from the Roanoke River area. Two tags were returned from the Weldon area in 2008 and in 2009. The Roanoke River area has accounted for 46.8% of the total returns. Twelve tags have been returned from outside the internal waters of North Carolina (Table 17). Seven tags were returned from the Pungo and Tar rivers and Neuse River near Goldsboro (Table 18). A total of 8 tags have been returned from the Oregon Inlet area (Table 19). Hook-and-line has accounted for 81.2% of the returns, followed by electro-fishing (n=32, 8.3%), gill nets (n=17, 4.4%) and pound nets (n=23, 6.0%).

Spring 2006

During the spring 2006, a total of 5,020 striped bass was tagged and released near Weldon (Table 16). The number of fish tagged and released in 2006 far exceeded any of the previous years since the program began in 1991. Thus far, 450 tags have been returned, with 70 (15.6%) of these returns being from Roanoke River, within 20 days of release. Over 43% of the total returns have been from the Roanoke River. Table 17 shows the returns (n=21) from outside the State's internal waters. Thirteen tags have been returned from the CSMA (Table 18). A total of 14 tags have been returned from the Oregon Inlet area (Table 19). Hook-and-line has accounted for 83.2% of the returns.

Spring 2007

A total of 2,796 striped bass were tagged and released near Weldon (Table 16). Through December 2009, 177 tags have been returned. Forty-one of the returns were from the Roanoke River area within 30 days of release. Twelve returns have been from outside North Carolina's waters (Table 17). Returns from state waters outside the ASMA have totaled 7, with 6 of these being from the Pungo River area and one from Juniper Bay, off Pamlico Sound (Table 18). Eight returns have been from the Oregon Inlet area (Table 19). Hook and line has accounted for 87.5% of the returns followed by gill nets (7.4%).

Spring 2008

From April through early June, a total of 4,153 striped bass were tagged and released on the spawning grounds in Roanoke River (Table 16). Three hundred and seventy-seven tags have been returned and 99 of the returns were from the spawning grounds within 30 days. A total of 185 tags (49%) have been returned from the spawning grounds in Roanoke River. Twenty-four tags have been returned from outside NC waters (Table 17). Six returns have occurred from internal waters in the Pungo River area (Table 18). Hook and line has accounted for 87.7% of the returns, followed by commercial gears (n=34, 9%).

Spring 2009

A total of 3,271 striped bass was tagged from April through May on the spawning grounds in Roanoke River (Table 16). Through December 2009, a total of 171 tags have been returned. One hundred and nine of the returns (63.7%) were from the spawning grounds within 30 days of release. Three tags have been returned from Massachusetts waters, one from New Jersey and two from Back Bay, VA (Table 17). Two returns have been from the Pungo and Pamlico rivers, one from Pamlico Sound area and one from New River near Jacksonville (Table 18). One tag has been returned from the Oregon Inlet area (Table 19).

Roanoke River Recovery Summary

The numbers of striped bass tagged and recovered by year from the spawning stock survey are shown in Table 16. The number of returns by year from fish, 18 inches TL or larger at release and at large for eight or more days are shown in Table 20.

Tag returns have occurred from outside the internal waters of North Carolina (Table 17), from the internal waters of North Carolina, outside the ASMA (Table 18) and the Oregon Inlet area (Table 19).

The number of striped bass tagged and released, 28 inches (TL) or larger has increased in recent years. Since 2001, the percentage of larger fish (≥ 28 in TL) tagged ranged from 1.7 – 7%, with females dominating the numbers. The total number of striped bass tagged and released, ≥ 28 inches (TL) and the returns by area are shown in Table 21. Table 22 shows the number of returns from the internal waters of North Carolina of ≥ 28 inch (TL) striped bass tagged on the spawning grounds, Roanoke River.

ASMA/RRMA Summary of Adult Tagging

Since 1988, 69,433 adult striped bass have been tagged and released throughout the Albemarle Sound and its tributaries. A total of 6,212 tags have been returned, for an overall return rate of 8.9%.

One hundred and thirty-nine tags (2.2%) have been returned from outside the internal coastal waters of North Carolina (Table 4, 6, 10 and 17). Historical adult tag recovery databases (Street et al. 1975; Johnson et al. 1981; Hassler and Taylor 1986) suggested that the Albemarle/Roanoke striped bass stock was composed principally of a discrete resident population, however these conclusions were based upon tag returns from 3 through 5 year old fish that were not likely to migrate out of the system. Since the mid-1990s however, the age structure of the Albemarle/Roanoke stock has expanded significantly and 89 (64%) of

the returns from outside the internal coastal waters of North Carolina have occurred during the time period 2003 – 2009. One hundred and forty-seven tags have been returned from the Oregon Inlet area since 1997, one return was reported in 2009 (Table 11 and 19). The number of tags returned from areas south of the ASMA has increased over time accounting for 2.3% (n= 142) of the total tag returns (Table 12 and 18). One hundred and twenty-one of the returns from these areas south of the ASMA were from striped bass tagged and released on the spawning grounds, Roanoke River. Seventeen tags have been returned from the Meherrin, Blackwater and Nottoway rivers in Virginia, which join to form the Chowan River (Table 12 and 18), from Back Bay, VA and North Landing River, VA. Record increases in juvenile production since the early 1990s coupled with a significantly expanding age structure has resulted in an expansion in range of the Albemarle/Roanoke origin striped bass.

The tag return data shows that the tagged fish have contributed to the commercial and recreational harvest and to the spawning populations. Recreational anglers have returned 76.2% of all tags while commercial harvesters have returned 19.8%. These returns do not reflect the allocation of the allowed harvest, since parity was achieved between both sectors in 1998. The Total Allowable Catch (TAC) for the ASMA/RRMA in 2003 was set at 550,000 pounds and has remained at that level. The ASMA commercial allocation is 275,000 pounds and the recreational is 137,500 pounds for each management area, ASMA and RRMA. Theoretically, with equal harvest allocation to the commercial and recreational fisheries, tag returns should be about equal from each sector. With only 19.9% of the tags being returned by commercial fishermen, under-reporting from this fishery appears to be significant. The reporting rate from recreational fishermen is unknown but anecdotal information suggests some segments of this fishery under-report as well. Commercial fishermen and some recreational charter boat fishermen have stated that they refuse to return striped bass tags because they feel "the information will be used against them for further restrictions". The Division should consider implementation of a high reward tag system to assess tag return reporting rates.

DMF Adult Striped Bass Tagging – Central/Southern Management Area

The Division through on-going independent gill net and electro-fishing surveys have tagged and released adult striped bass in the Cape Fear, Neuse, and Pamlico river areas and the Pamlico Sound area since 1999. The number of striped bass tagged by year and system are shown in Table 23.

Cape Fear River System

In the Cape Fear River area a total of 102 striped bass were tagged and released from 2003 – 2006 (Figure 2). Table 23 shows the number of fish tagged and returns by year. Eleven tags have been returned, all from hook-and-line, with returns from between Lock and Dam #2, mouth of Town Creek and the Brunswick River.

During December 2008, a total of 42 striped bass was tagged and released in the Cape Fear and Northeast Cape Fear rivers. All fish were captured by hook and line and ranged from 17 – 26.5 inches total length. Three tags were returned within one to five days of release. An additional three tags were returned during the spring 2009 and two in the fall. All tag returns were within three miles of the release sites and by hook and line.

Table 21. Total number of striped bass tagged and released, 28 inches and larger from the Roanoke River and returns by area.

Year	Total Number Tagged	Number 28 In/ Larger	Percent of Total – 28 In/ Larger	Number of Females	Number of Males	No/ % Returns Inside ASMA	No/ % Returns Inside RRMA	No/% Returns Oregon Inlet Area	No/% Returns Outside NC Int. Waters	No/% Returns NC Waters out ASMA
1995	1,265	2	0.1	1	1					
1996	1,378	4	0.2	4	-			1 (F) (25%)		
1997	2,167	7	0.3	6	1		1 (M) (100%)		1 (F) (16.7%)	
1998	2,060	10	0.4	10	-			2 (F) (20%)		
1999	2,177	22	1.0	17	5			1 (F) (5.9%)		
2000	1,970	14	0.7	11	3		1 (F) (9 %)	2 (F) (18.1%)	1 (M) (33.3%)	
2001	2,647	45	1.7	32	13			1 (F) (3.1%)	3 (F) (9.4%) 1 (M) (7.7%)	
2002	2,032	72	3.5	48	24		1 (F) (2.0%) 2 (M) (8.3%)	2 (F) (4.2%) 5 (M) (20.8%)	1 (F) (2.0%) 2 (M) (8.3%)	1 (M) (4.2%)
2003	3,146	140	4.4	113	27	3 (F) (2.6%) 1 (M) (3.7%)	4 (F) (3.5%) 1 (M) (3.7%)	2 (F) (1.8%)	5 (F) (4.4%)	
2004	1,530	109	7.0	89	20		5 (F) (4.5%)	1 (M) (5.0%) 1 (F) (1.1%)	6 (F) (6.7%)	1 (M) (5.0%)
2005	4,104	75	1.8	66	9	2 (F) (3.0%) 1 (M) (11.1%)	3 (F) (4.5%)	1 (F) (1.5%)	8 (F) (12.1%)	1 (F) (1.5%)
2006	5,020	209	4.1	179	30	1 (M) (3.3%)	6 (F) (3.3%)	5 (M) (16.7%) 4 (F) (2.2%)	20 (F) (11.2%) 1 (M) (3.3%)	1 (F) (0.5%)
2007	2,796	142	5.1	114	28	1 (F) (0.8%)	3 (F) (2.6%) 3 (M) (10.7%)	2 (F) (1.7%) 1 (M) (3.6%)	11 (F) (9.6%) 1 (M) (3.6%)	1 (F) (1.7%) 1 (M) (3.6%)
2008	4,153	148	3.6	119	29				18 (F) (15.1%) 2 (M) (6.9%)	
2009	3,271	71	2.2	59	12	1 (F) (1.7%)			4 (F) (6.8%)	1 (M) (8.3%)

Table 22. Total number of striped bass returns from internal waters of North Carolina, 28 inches (TL) and larger from Roanoke River tagging.

Date released	Recapture date	Recapture location	Number of days at large	Release/recapture length (mm, TL) and sex
May 5, 1997	Nov 5, 1997	Below Roanoke Rapids dam	184	774/- (M)
Apr 17, 2000	Apr 29, 2000	Above Weldon	12	719/- (F)
Apr 15, 2002	May 26, 2003	Above Weldon	406	804/- (M)
Apr 15, 2002	May 2, 2002	Weldon	21	782/- (F)
Apr 22. 2002	May 6, 2002	Weldon	14	805/- (M)
May 5, 2003	Apr 30, 2004	Scotland Neck	359	939/- (F)
May 5, 2003	Apr 19, 2004	Weldon	349	837/- (M)
May 5, 2003	Apr 6, 2004	Manns Harbor	336	973/- (F)
May 5, 2003	Apr 29, 2004	Weldon	359	798/- (F)
May 12, 2003	May 19, 2003	Weldon	7	749/- (F)
May 12, 2003	Apr 17, 2007	Batchelor Bay	1,435	909/950 (F)
May 27, 2003	Nov 14, 2003	Off Wanchese	171	769/- (F)
May 27, 2003	May 4, 2004	Weldon	342	852/- (F)
May 27, 2003	Oct 15, 2007	Albemarle Sound Bridge	1,601	737/838 (M)
Apr 26, 2004	Apr 22, 2005	Williamston	361	888/- (F)
May 4, 2004	May 8, 2006	Weldon	734	910/- (F)
May 4, 2004	Oct 1, 2005	Pungo River	515	715/- (M)
May 4, 2004	Jun 5, 2004	Jamesville	32	930/- (F)
May 4, 2004	Apr 28, 2008	Weldon	1,454	957/1,070 (F)
May 4, 2004	May 5, 2008	Weldon	1,461	838/900 (F)
Apr 25, 2005	Apr 15, 2006	Halifax	355	870/- (F)
May 2, 2005	May 4, 2005	Weldon	2	860/- (F)
May 9, 2005	May 4, 2009	Weldon		940/1,049 (F)
May 16, 2005	Mar 18, 2006	Manns Harbor	306	961/- (F)
May 23, 2005	Nov 14, 2005	Manns Harbor	175	750/- (M)
May 23, 2005	Oct 15, 2005	Off Mashoes	145	737/- (F)
Apr 24, 2006	Apr 20, 2007	Weldon	361	890/- (F)
Apr 24, 2006	Apr 21, 2007	Off Wanchese	362	925/- (M)
May 1, 2006	May 7, 2007	Weldon	371	920/- (F)
May 1, 2006	Apr 10, 2007	Roanoke River-Devils Gut	344	1,105/- (F)
May 1, 2006	Apr 30, 2007	Weldon	364	1,027/1,056 (F)
May 1, 2006	Apr 28, 2008	Weldon	727	1,044/1,135 (F)
May 8, 2006	May 5, 2008	Weldon	727	844/880 (F)
Apr 16, 2007	Jul 8, 2007	Pungo River - Leechville	83	735/- (M)
Apr 16, 2007	Apr 26, 2008	Weldon	375	819/851 (M)
Apr 16, 2007	Apr 24, 2008	Weldon	373	820/- (M)

Date released	Recapture date	Recapture location	Number of days at large	Release/recapture length (mm, TL) and sex
Apr 30, 2007	Apr 19, 2008	Near Odom Prison	354	842/- (F)
Apr 30, 2007	May 5, 2008	Weldon	370	935/948 (F)
May 7, 2007	May 5, 2008	Weldon	363	969/999 (F)
May 7, 2007	Aug 22, 2009	Currituck Sound Bridge	837	965/991 (F)
May 21, 2007	Jul 19, 2007	Pungo River – Leechville	59	737/ (F)
May 21, 2007	Apr 28, 2008	Weldon	342	746/771 (M)
Apr 28, 2008	May 4, 2009	Weldon	371	1,130/1,146 (F)
May 5, 2008	Oct 17, 2008	Off Wanchese	165	838/- (F)
May 5, 2008	May 4, 2009	Weldon	364	910/915 (F)
May 4, 2009	Dec 11, 2009	Pamlico S. – Berry Bay	221	825/860 (M)
May 11, 2009	Nov 23, 2009	Manns Harbor	196	762/787 (F)

Neuse River System

Since 1999, DMF has tagged and released 1,128 striped bass in the Neuse River area (Figure 2). The number of fish tagged by year, number of returns and recapture areas are shown in Table 23. Hook-and-line has accounted for the majority of the returns (84.7%). The majority of the returns have occurred from the Neuse River area (Table 23). Two returns have occurred from the Pamlico River, one from Roanoke River, near Jamesville, one from Oregon Inlet and one from the Atlantic Ocean off Avalon Pier (Kill Devil Hills).

Pamlico River Area

In the Pamlico River and tributaries, 284 striped bass have been tagged and released by DMF since 1999 (Figure 2). The number tagged, number of returns, recapture gears and return areas are shown in Table 23. A total of 42 tags have been returned, with hook-and-line accounting for 28 returns and commercial gill nets 13 returns. The remaining tag was recaptured by DMF through the independent gill net survey. The majority of the returns have been from the Tar/Pamlico area. However, three tags were returned from Roanoke River, one from Alligator River and one from the Trent River.

Pamlico Sound Area

The Division, through independent gill net surveys has tagged and released 111 striped bass in the Pamlico Sound area since 2000 (Figure 2). Only four tags have been returned from these tagged fish. The number tagged, number of returns and return areas are shown by year in Table 23. One of the returns was from Moriches Inlet, Long Island, NY. The fish was tagged March 4, 2003 near Swan Quarter and recaptured November 26, 2004. The remaining returns were from the internal waters of North Carolina.

Table 23. Number of adult striped bass tagged and released through DMF independent gill net and electrofishing surveys in the CSMA. The tag returns by system, year, gear and return area are presented below.

System	Release year	# tagged	Recap. Gear	# returned	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Return area
Cape Fear	2003	7		0											
	2004	50	HL-8	8					6	1	1				Lock/Dam #2 to Brunswick River
	2005	19	HL-3	3						2		1			Lock/Dam #1 area
	2006	26	HL-2	2							2				Wilmington to mouth Town Creek
	2008	42	HL-8	8									3	5	NE Cape Fear River to Wilmington
Neuse	1999	12	HL-2	2		2									Trent River
	2000	13	HL-1	1	1										Neuse R- Lenior Co.
	2003	30	HL-4	4				2		2					New Bern/Trent River to Hancock Cr.
	2004	59	HL-7 GN-3	10					6	4					Smithfield to Below New Bern, Pamlico R., Roanoke R- Jamesville
	2005	98	HL-14 GN- 2	16						4	7	4	1		Slocum Cr to Raleigh, Pamlico R- Garrison Pt.
	2006	375	HL- 58 GN-11 ES- 1	70							37	30	1	2	Hancock Cr. To above New Bern
	2007	180	HL- 34 GN- 5 ES- 4	43								33	9	1	Near Goldsboro to Hancock Creek; Oregon Inlet (1)
	2008	279	HL- 39 GN- 2	41									27	14	New Bern to Slocum Creek; Atlantic Ocean – Avalon Pier; Pamlico River – Chocowinity Bay
	2009	82	HL - 2	2										2	Slocum Creek
Pamlico	1999	2		0											
	2000	13	GN-2	2	1		1								Chocowinity Bay to mid-Pamlico R.
	2001	21	GN-2	2		1	1								Washington to Chocowinity Bay
	2003	28	HL-3 GN-2	5				1	4						Below Washington to Adams Cr, Pungo R,
	2004	16													
	2005	38	HL-8 GN-1 DMF GN-1	10						2	4	3	1		Upper Pamlico River, Pungo River, Roanoke River- Plymouth, Trent River, Alligator River
	2006	48	HL- 7 GN- 2	9							5	4			Washington to Rocky Mt; Roanoke Rapids
	2007	36	HL- 6 GN- 2	8								8			Upper Pamlico River
	2008	56	HL- 4 GN-1	5									2	3	Pamlico River to Pungo River; Roanoke River – Weldon
	2009	26	GN-1	1										1	Mouth of Bath Creek

Table 23. Continued

System	Release year	# tagged	Recap. gear	# returned	2002	2004	2005	Return area
Pamlico Sound	2000	6						
	2001	8	HL-1	1	1			Roanoke R.- Scotland Neck
	2002	14	PN-1	1	1			Croatan Sound- Manns Harbor
	2003	29	HL-1	1		1		Moriches Inlet, Long Is., NY
	2004	19	HL-1	1			1	Hatteras Harbor
	2005	14		0				
	2006	12		0				
	2007	9		0				

WRC Adult Striped Bass Tagging- Central/Southern Management Area

The North Carolina Wildlife Resources Commission in the spring of 2002 through spawning stock surveys (electro-fishing) began tagging adult striped bass on the spawning grounds. Internal anchor tags are supplied by DMF for these tagging efforts. Length (mm, TL) and sex data are recorded for each striped bass tagged. Weights and scale samples are obtained from a portion of the fish.

Cape Fear River

Striped bass were tagged in the Cape Fear River area from 2003 - 2009 by the WRC (Figure 3). All of the tagging effort has been from between Lock and Dam #1 and Lock and Dam #3. Table 24 shows the number of fish tagged by year, number returned, recapture gear and return areas. Four hundred and twenty-four fish have been tagged and released and 59 tags (13.9%) returned. Hook-and line has accounted for all of the returns. All returns have occurred from Buckhorn Dam to Wilmington, except for one from off Montauk Lighthouse, NY, in July 2006. The number of striped bass tagged, ≥ 28 inches TL, by sex and returns by year are presented in Table 25.

Neuse River

Adult striped bass have been tagged and released on the spawning grounds in the Neuse River by the WRC annually since 2002 (Figure 3). Tagging efforts have occurred from Milburnie Dam, Raleigh to around the Goldsboro area. The release year, number tagged, returns by gear and year and return areas are shown in Table 24. A total of 1,896 striped bass have been tagged and released and 171 tags (9%) returned. Hook-and-line has accounted for 79.4% of the returns. All tags have been returned from the Neuse River area (primarily New Bern and Trent River), except two from the Tar River. The number of fish ≥ 28 inches TL, by sex and returns by year for the Neuse River are shown in Table 25.

Tar River

A total of 3,722 striped bass have been tagged and released by the WRC in the Tar River since 2002 (Figure 3). Sampling effort has been centered from below Rocky Mount to below Tarboro. The tagging and return information by year is shown in Table 24. Four hundred and forty-two tags have been returned and hook-and-line accounts for 83.3% of these returns. The majority of the tag returns have been from the Tar/Pamlico area. Twelve tags have been returned from outside the Pamlico system (Table 24). Table 25 shows the number of striped bass ≥ 28 inches TL tagged and released in the Tar River, by sex and the returns.

CSMA Summary

Tagging studies conducted by Marshall (1977), Hawkins (1980) and Winslow et al. (1983), indicated that Neuse, and Tar-Pamlico striped bass are riverine and endemic. However, the majority of these fish were of a young age when tagged and recaptured. Fischer (1980) and Winslow et al. (1983) reported that striped bass were abundant in the Cape Fear River below Wilmington, January through May. Tagging studies as reported by Winslow et al. (1983) suggest that the Cape Fear River stock is riverine endemic, with exchange between the Cape Fear and the Northeast Cape Fear rivers.

From 1980 through 1999, very little tagging effort occurred on adult striped bass in the CSMA. Since the Division and the WRC have undertaken tagging projects in the CSMA the majority of the returns continue to suggest predominately riverine endemic stocks, with a limited amount of migration to other systems. As both agencies continue tagging projects in these systems additional tag return data will allow for further evaluation of the stocks.

Table 24. Number of adult striped bass tagged and released by the North Carolina Wildlife Resources Commission in the CSMA.

System	Release year	No. tagged	Recap. Gear	No. returned	2002	2003	2004	2005	2006	2007	2008	2009	Return area
Cape Fear	2003	29	HL-6	6		5	1						Buckhorn Dam/ Wilmington
	2004	44	HL-13	13			9	4					Lock/Dam 1, 2, 3 to Town Creek
	2005	81	HL-18	18				14	4				Lock/Dam 2 and 3 to Town Creek; Montauk Lighthouse, NY
	2007	67	HL-8	8						6		2	Lock/Dam 1 to 3; Northeast Cape Fear River
	2008	121	HL - 14	14							12	2	Town Creek to Lock and Dam #3
	2009	82	HL – 1	1								1	CFR - Lower Little River
Neuse	2002	79	HL-8 GN-1 WRC ES-2	12	6	2	2	2					Clayton/New Bern/Goose Creek Tar River
	2003	352	HL-55 GN- 11 DMFGN-1 WRC ES-10	77		43	22	5	6		1		Milburnie Dam/Clubfoot Cr, including Trent R.
	2004	44	HL-1 GN-1	2				2					New Bern area
	2005	136	HL-20 WRC ES- 3	23				15	8				Pitch Kettle to below New Bern
	2006	55	HL-8	8					7	1			Flowers Gap to Hancock Cr.

Table 24 -	Continued												
System	**Release year**	**No. tagged**	**Recap. Gear**	**No. returned**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Return area**
	2007	169	HL-21 ES – 1 GN –1 DOA - 1	24						16	6	2	Above New Bern to Slocum Creek
	2008	126	HL – 9 ES – 2	11							9	2	New Bern to Wilson Mills; Tar River - Greenville
	2009	343	HL - 14	14								14	Goldsboro to Trent River
Tar	2002	298	HL- 24 GN- 4 DOA- 1	29	10	9	6	2	2				Rocky Mt/ Broad Cr., 1 above mouth of Cashie River
	2003	177	HL- 23 GN- 4 DMFGN-1	28		5	16	6	1				Rocky Mount/Grimesland/Broad Cr. Bogue Sound- Atlantic Beach
	2004	274	HL- 40 GN-6 Crab pot-1	47			23	13	7	2	2		Tarboro/Bath Creek Roanoke River- Jamesville Neuse River above New Bern
	2005	1,273	HL-133 GN-24 DMF GN-9 PN - 1	167				53	68	39	3	4	Rocky Mount to Pungo Creek, Roanoke River (4), Albemarle Sound area (3), Shinnecock Inlet, NY
	2006	535	HL- 70 GN- 11 DMFGN-1	82					44	36	1	1	Rocky Mount to Aurora
	2007	317	HL- 36	36						29	5	2	Rocky Mount to Goose Creek, Pitch Kettle Creek, Albemarle Sound, Spring Lake, NJ

Table 24 -	Continued												
System	**Release year**	**No. tagged**	**Recap. Gear**	**No. returned**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Return area**
	2008	501	HL – 34 GN - 10	44							23	21	Rocky Mount to Aurora; Neuse River – Kennels Beach
	2009	347	HL – 8 GN - 1	9								9	Tar River – Kennedy Cr to Bath Creek

Table 25. Total number of striped bass tagged and released, ≥ 28 inches (TL) in the CSMA by the North Carolina Wildlife Resources Commission.

Cape Fear River Area

Year	Total N Tagged	N tagged 28 inch/ Larger	Percent of Total	N Females	N Males	Release date	Location	Recapture date	Recapture Location	Size/Sex
2003	29	9 (4 unknown sex)	31	5		Apr 9, 2003	Cape Fear	Sep15, 2003	Wilmington	742/F
						May 3, 2003	Cape Fear	May 3, 2004	Cape Fear	778/F
2004	44	7	15.9	7		Apr 14, 2004	Lock/Dam #2	Dec 22, 2005	Town Creek	716/F
						Apr 15, 2004	Lock/Dam #1	Sep 25, 2004	Lock/Dam #1	720/F
						May 13, 2004	Lock/Dam #2	Jul 3, 2004	Lock/Dam #2	722/F
2005	81	26	32	19	7	Apr 12, 2005	Lock/Dam #1	Jan 8, 2006	Northeast Cape Fear	736/F
						Apr 12, 2005	Lock/Dam #1	Dec 11, 2005	Town Creek	718/F

Table 25.	Continued									
Year	**Total N Tagged**	**N tagged 28 inch/ Larger**	**Percent of Total**	**N Females**	**N Males**	**Release date**	**Location**	**Recapture date**	**Recapture Location**	**Size/Sex**
						Apr 19, 2005	Lock/Dam #1	May 11, 2005	Lock/Dam #2	714/F
						May 10, 2005	Lock/Dam #3	Oct 29, 2006	Mouth Brunswick River	732/F
2007	67	7	10.6	4	3					
2008	121	9	7.4	7	2					
2009	82	5	6.1	2	3					

Table 25. Continued.
Neuse River Area

Year	Total N tagged	N tagged 28 inch/ Larger	Percent of Total	N Females	N Males	N Unkn.	Release Date	Location	Recapture Date	Recapture Location	Size/Sex
2002	79	12	15.2	7	5		Apr 12, 2002	Below Quaker Neck	Jul 23, 2002	New Bern	742/F
							Apr 12, 2002	Below Quaker Neck	Sep 21, 2002	New Bern	772/F
2003	352	27	7.7	22	5		Apr 23, 2003	Below Milburnie Dam	Aug 14, 2004	Above New Bern	716/F
							Apr 23, 2003	NC 42 – Johnson County	Sep 30, 2007	New Bern	720/M
							May 5, 2003	Above Quaker Neck	Sep 27, 2006	Goose Creek	731/F
2004	44	7	15.9	4	3						
2005	136	12	8.8	5	5	2					
2006	55	2	3.6	2	0		Apr 12, 2006	Goldsboro	Oct 3, 2006	Hancock Creek	850/F

Year	Total N tagged	N tagged 28 inch/ Larger	Percent of Total	N Females	N Males		Release Date	Location	Recapture Date	Recapture Location	Size/Sex
2006							May 5, 2006	Near Goldsboro	Sep 27, 2006	Goose Creek	730/F
2007	169	10	5.9	7	3						
2008	126	3	2.4	2	1						
2009	343	0									

Table 25. Continued.
Tar River Area

Year	Total N tagged	N tagged 28 inch/ Larger	Percent of Total	N Females	N Males	Release Date	Location	Recapture Date	Recapture Location	Size/Sex
2002	298	36	12.1	23	13	Apr 17, 2002	Tar River	Jan 1, 2005	Near Bath	754/M
						Apr 24, 2002	Tar River	Jul 23, 2006	Near Aurora	777/M
						Apr 24, 2002	Below Rocky Mt.	Aug 31, 2002	Kennedy Cr.	733/F
						Apr 29, 2002	Near Tarboro	Jun 19, 2002	Below Tarboro	713/F
2003	177	27	15.2	21	6	Apr 29, 2003	Near Rocky Mt.	Oct 21, 2004	Gaylord Bay	730/M
						May 5, 2003	Near Rocky Mt.	Jun 18, 2005	Pamlico River	740/F
2004	274	49	17.9	34	15	Apr 19, 2004	Near Rocky Mt.	Aug 8, 2004	Washington	748/F
						Apr 19, 2004	Near Rocky Mt.	Nov 19, 2004	Washington	711/F
						Apr 22, 2004	Near Tarboro	Jul 16, 2006	Near Aurora	757/F

Year	Total N tagged	N tagged 28 inch/ Larger	Percent of Total	N Females	N Males	Release Date	Location	Recapture Date	Recapture Location	Size/Sex
2004						Apr 22, 2004	Near Tarboro	Mar 25, 2007	Gaylord Bay	721/M
						Apr 27, 2004	Below Rocky Mt.	May 2, 2005	Greenville	754/F
						Apr 27, 2004	Below Rocky Mt.	Jul 19, 2004	Mouth Broad Cr.	712/F
						Apr 28, 2004	Near Tarboro	Oct 20, 2004	Washington	714/F
2005	1,273	33	2.6	14	19	Apr 12, 2005	Near Rocky Mt.	Apr 3, 2006	Bear Creek	740/M
						Apr 14, 2005	Near Rocky Mt.	Apr 30, 2005	Dunbar Bridge	745/F
						Apr 14, 2005	Near Rocky Mt.	Apr 25, 2005	Near Tarboro	717/M
2006	535	8	1.5	2	6					
2007	317	6	1.9	4	2	Apr 9, 2007	Near Tarboro	Mar 24, 2008	Pitch Kettle	891/F
						Apr 30, 2007	Near Tarboro	Jul 2, 2008	Spring Lake, NJ	1,011/F
2008	501	2	0.4	0	2					
2009	347	3	0.9	3	0					

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